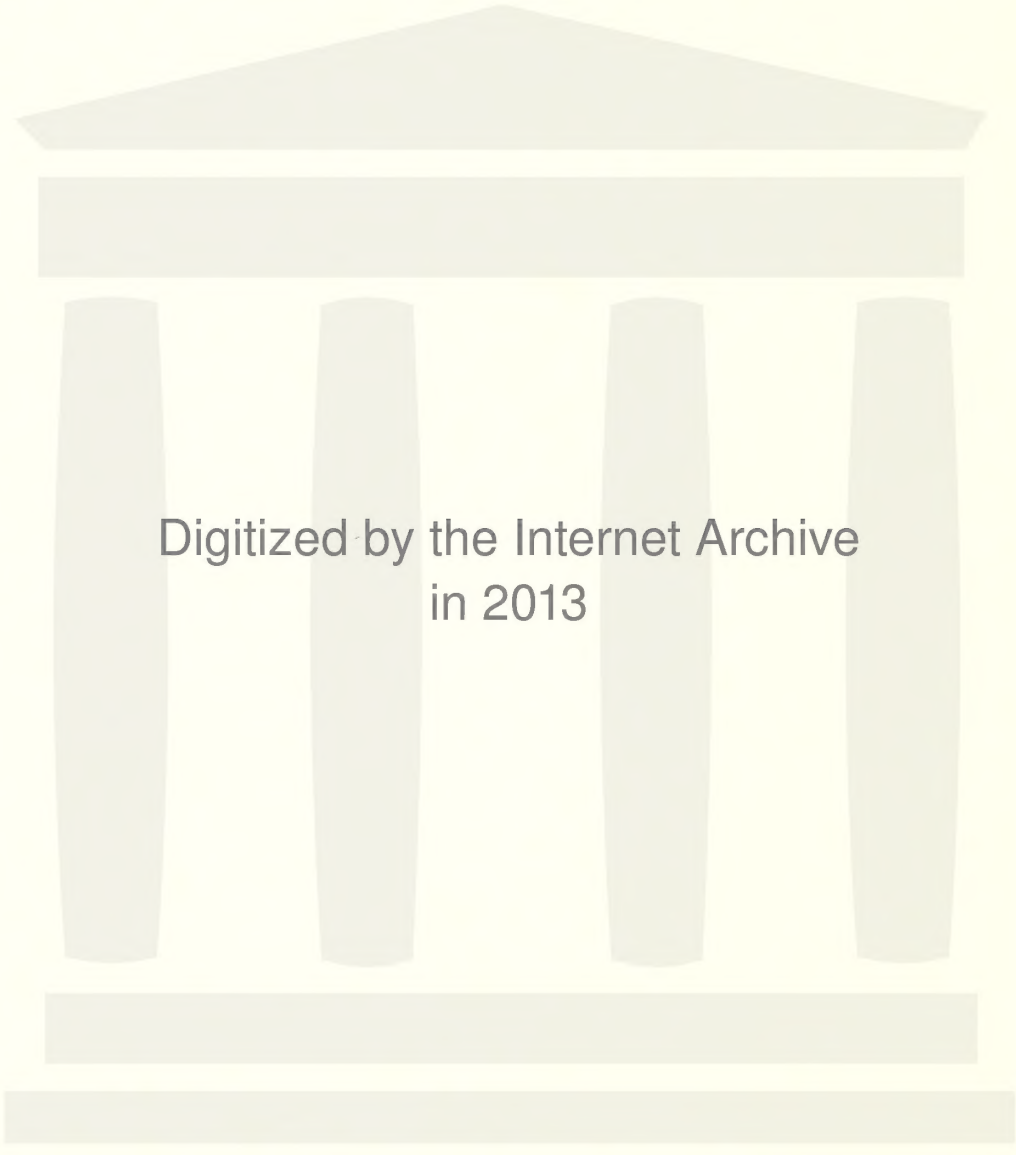
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Resource Bulletin **NC-71**

Primary forest products industry and timber use, Missouri, 1980

James E. Blyth, Shelby Jones, and W. Brad Smith

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SAW LOGS

CHARCOAL WOOD

COOPERAGE

PULPWOOD

VENEER LOGS

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FOREWORD

This Bulletin contains the results of a detailed study of forest industry, industrial roundwood production, and associated primary mill wood and bark residue in Missouri in 1980. Such detailed information is necessary for intelligent planning and decision-making in wood procurement, forest resource management, and forest industry development. Likewise, researchers need current forest industry and industrial roundwood information to plan projects.

Special thanks are given to the primary wood-using firms that supplied information for this study. Their cooperation is greatly appreciated.

Quantities shown may vary slightly from one table to another because of rounding differences, but these differences are insignificant.

PRIMARY FOREST PRODUCTS INDUSTRY AND TIMBER USE, MISSOURI, 1980

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HIGHLIGHTS

- Since 1946 more than 2,200 small sawmills have ceased operations while the number of large and medium-size mills has nearly quadrupled.
- Industrial roundwood production in 1980 was 12 percent lower than in 1969, when industrial roundwood production was last estimated. Major declines were in charcoal wood and cooperage logs.
- Red oak, the leading species cut, provided 52 percent of the industrial roundwood.
- The Eastern Ozarks supplied 45 percent of all industrial roundwood.
- From a sustained yield basis, sweetgum, yellow-poplar, and cottonwood appear to have been overutilized in 1980, and black cherry, redcedar, sycamore, basswood, soft maple, white oak, elm, birch, hickory, and ash seem to have been underutilized.
- Saw log production, 82 percent of all industrial roundwood, was 406 million board feet—up 7 percent from 1969.
- Principal saw log species were red oak, white oak, shortleaf pine, cottonwood, and black walnut.
- Missouri continued to lead the Nation in cooperage log (28,500,000 board feet) and charcoal wood (241,000 cords) production.
- The charcoal industry has shifted from heavy dependence on roundwood in 1969 to intensive use of Missouri primary wood-using mill residue.
- Coarse mill residue is in strong demand for manufacturing pulp and charcoal.
- Great progress has been made since 1969 in finding markets for residue. However, additional markets for fine and bark residue generated at primary wood-using mills are needed because more than one-fourth of the bark and more than three-fifths of the fine residue was not used in 1980.

PRIMARY FOREST INDUSTRY—INDUSTRIAL ROUNDWOOD

Sawmills dominate the active (operating) primary wood-using mill population in Missouri. Out of an estimated 599 active mills in 1980, 486 were sawmills. Other important mill groups include cooperage mills, charcoal plants, and treating plants.

The active sawmill population has steadily declined since World War II. Nearly 2,600 mills operated in 1946, but the number fell to less than 1,000 in 1958 and to 549 in 1969. Since 1946, more than 2,200 small sawmills (cutting less than one million board feet annually) have dropped out of production while the number of large- and medium-size mills has nearly quadrupled. More than one-half of the mills cutting more than one million board feet annually are in the Eastern Ozark Unit (fig. 1).

Eighty-five cooperage mills operated in 1946. Then the industry consolidated as the active mills dropped to 36 in 1958. Since then the number of operating mills has remained relatively steady although falling to 30 in 1980. All Inventory Units have cooperage mills, but the heaviest concentration is in the Eastern Ozarks.

During the late 1940's and the 1950's, the charcoal industry expanded rapidly. Only 3 mills produced charcoal in 1946, but the number had jumped to 60

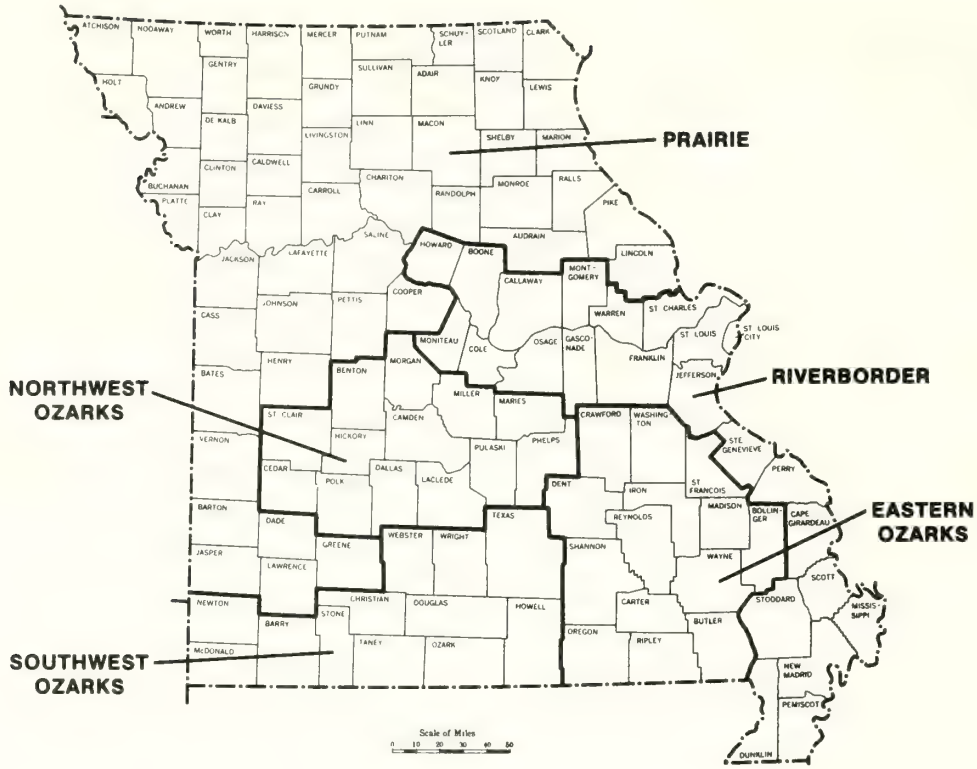

Figure 1.—*Inventory Units in Missouri. Inventory Units are the geographical areas used by the Forest Inventory and Analysis Project (formerly Resources Evaluation) to report periodic inventories and use of the Nation's forest resources.*

by 1958 before falling to a fairly stable 36 in 1980. Most (all but two) of the plants are about evenly distributed between the three Ozark Units.

In contrast to the decline in charcoal plants, the wood-treating industry has steadily expanded from 6 plants in 1946 to 28 in 1980. All Units contain treating plants although the largest concentration is in the Southwestern Ozarks. These plants process and treat wood posts with preservatives.

Industrial roundwood production in 1980 rose or fell in each Unit by at least 13 percent since 1969. Overall, the decline in the State was 12 percent:

Unit	Production 1969 (Thousand cubic feet)	Production 1980 (Thousand cubic feet)	Change (Percent)
Eastern Ozarks	45,604	39,635	−13
Southwestern Ozarks	17,940	14,639	−18
Northwestern Ozarks	9,388	10,670	+14
Prairie	11,359	13,594	+20
Riverborder	14,674	9,020	−39
Total	98,965	87,558	−12

The Eastern Ozarks continued to dominate the harvest by supplying 45 percent; each of the other Units supplied at least 10 percent.

Red oak provided more than half (52 percent) of the harvest followed by white oak (20 percent) and shortleaf pine (6 percent). Other important species included cottonwood, black walnut, hickory, and sycamore.

TIMBER REMOVALS FOR INDUSTRIAL ROUNDWOOD

Estimated timber removals for industrial roundwood (from growing stock on commercial forest land) were 76.7 million cubic feet. Timber removals in each inventory unit per thousand acres of commercial forest land[1] were:

[1]*Area of commercial forest land in 1972 at the time of the last forest inventory in Missouri.*

Unit	Removals/thousand acres (Cubic feet)	(Cords)
Eastern Ozarks	8,346	106
Southwestern Ozarks	5,532	70
Northwestern Ozarks	4,580	58
Prairie	6,455	82
Riverborder	4,015	51
All Units	6,200	78

Cutting of growing stock (on a commercial forest area basis) was heaviest in the Eastern Ozarks and lightest in the Riverborder Unit. Harvest intensity of growing stock was light in all Units.

Timber removals (for industrial roundwood) in 1980 by species were compared with net annual growth determined during the previous Missouri forest inventory (1971). These comparisons show in a rough way which species may have been overcut or undercut in 1980 (in terms of sustained yield). Species with removals greater than 110 percent of net annual growth or less than 75 percent of growth were:

Species	Removals (Percent of net annual growth)
Sweetgum	369
Yellow-poplar	189
Cottonwood	152
Beech	111
Black walnut	67
Blackgum	58
Shortleaf pine	54
Red oak	51
Black cherry	43
Red cedar	39
Sycamore	36
Basswood	35
Soft maple	35
White oak	33
Elm	32
Birch	31
Hickory	24
Ash	16

These indicators of possible over- or underutilization should be used cautiously because (1) wood procurement volumes change from year to year, (2) net annual growth used in the comparison was for 1971, (3) sampling errors may be high for individual minor species because only 18 percent of the sawmills were sampled, (4) stand-age structure may mask the extent of under- or overutilization, and (5) apparent over- or undercutting may be a temporary timber management strategy to improve stand structure and species mix.

Allowing for these cautions, sweetgum, yellow-poplar, and cottonwood appear to have been overcut and black cherry, redcedar, sycamore, basswood, soft maple, white oak, elm, birch, hickory, and ash seem to have been undercut in 1980.

SAW LOGS

In 1980, 82 percent of the industrial roundwood harvest was saw logs. Loggers cut 406 million board feet of saw logs in Missouri, up 7 percent from the last study estimate in 1969. All but 8 percent was hardwood. Principal species harvested were red oak, white oak, shortleaf pine, cottonwood, and black walnut.

Only 7 million board feet of saw logs were shipped to sawmills in other States; Iowa and Kansas customers procured the majority. Black walnut was the principal species shipped out-of-State.

Compared to 1969, major gains in output were in red oak and shortleaf pine. Production dropped 4 million board feet or more from 1969 for each of five species—white oak, soft maple, sycamore, elm, and sweetgum.

More than half of the shortleaf pine, red oak, and white oak was cut in the Eastern Ozark Unit, the leading saw-log producing region. The Prairie Unit was the primary supplier of black walnut and cottonwood—this Unit contains the largest volume of walnut and the second largest supply of cottonwood in the State.

Missouri sawmills imported 15 million board feet of saw logs from seven States, primarily Illinois. Red oak, white oak, and black walnut led the list of saw log imports. Mills in the Prairie and Riverborder Units procured most of the imports.

CHARCOAL WOOD

Missouri continues to be the top-producing State for charcoal wood although the industry has matured and consolidated. Total charcoal wood production dropped from 285,000 cords in 1969 to 241,000 cords in 1980. However, the industry has shifted from heavy dependence on roundwood to intensive use of Missouri primary wood-using mill residue (slabs and edgings). Roundwood harvesting for charcoal dropped from 238,000 cords in 1969 to 88,000 cords in 1980. During this period, use of Missouri primary mill wood

residue for charcoal rose from 47,000 cords to 153,000 cords.

Oak constituted almost 9 out of 10 cords of charcoal wood cut in 1980. The Eastern Ozarks supplied three-fifths of the roundwood and more than one-half (53 percent) of the mill residue for charcoal. The industry procures all of its wood requirements within the State.

COOPERAGE

Missouri led the Nation in cooperage log production with 28.5 million board feet in 1980. All of the harvest was white oak for manufacturing tight cooperage. Producers shipped only 2 percent out-of-State for barrel-making.

Several changes in the cooperage and distilling industries led to a 47-percent decline in the cooperage log harvest since 1969. Marginal mills dropped out of production as competition for high quality white oak stiffened. Markets expanded for light whiskeys, which can be aged in reconditioned barrels and consequently lessens the demand for new barrels. Consumers' preferences for alcoholic beverages changed and broadened leaving less market share for the whiskey distillers.

Missouri cooperage mills received 31.5 million board feet of logs. These mills were widely dispersed with the largest concentration in the Eastern Ozarks. Four States—Illinois, Iowa, Arkansas, and Kentucky—supplied a total of 3.6 million board feet to the Missouri mills.

PULPWOOD

Missouri produced 105,000 cords of pulpwood of which 81,000 cords were residue from sawmills, veneer mills, and other mills.

Pulpwood production grew rapidly from 22,000 cords in 1966 to a peak of 136,000 cords in 1974. Since 1974, annual output has ranged from 99,000 to 132,000 cords. Softwoods are a minor part of the pulpwood mix. Initial nominal use of Missouri wood residue as pulpwood began in 1965 with swift expansion to a peak of 106,000 cords in 1976. Roundwood pulpwood output peaked in 1972 although residue has been a more important source since 1968.

All of the pulpwood was harvested in the Eastern Ozark, Prairie, and Riverborder Units. Ten pulpmills in Missouri, Illinois, Kentucky, Iowa, Oklahoma, and Tennessee received Missouri pulpwood (from roundwood and residue) in 1980.

VENEER LOGS

Veneer log production was 3.3 million board feet,[2] one-half of the output in 1966, but 24 percent above 1976. Most of the veneer logs were black walnut, cottonwood, and white oak. Demand for cottonwood climbed briskly from the nominal harvest in 1976.

One-third of the harvest was exported to Indiana, (the primary out-of-State market) Illinois, and Ohio. Walnut was the preferred export species to other States.

OTHER PRODUCTS

Other industrial roundwood products (3 percent of all industrial roundwood) included posts (processed at treating plants), handle bolts, and shavings bolts. About 2.8 million commercial posts were cut principally from oak and shortleaf pine. Posts were harvested chiefly in the Northwestern and Eastern Ozarks Units. Handle bolts came primarily from the Riverborder Unit; hickory was the preferred species.

SUMMARY-INDUSTRIAL ROUNDWOOD

Production of all industrial roundwood products was last determined in 1969. Industrial roundwood production for each product in 1969 and 1980 was:

Product	1969	1980
Saw logs (million bd. ft.)	379	406
Charcoal wood (thousand cords)	239	88
Cooperage logs (million bd. ft.)	54	28
Pulpwood (thousand cords)	24	25
Veneer logs (million bd. ft.)	5	3
Posts (thousand pieces)	NA[3]	2,835
Other (thousand cubic feet)	1,600	551

PRIMARY MILL RESIDUE

During 1980, Missouri primary wood-using mills (except pulpmills) generated 588,000 green tons of coarse residue, 377,000 green tons of fine residue, and 258,000 green tons of bark. Coarse residue is

[2]*Does not include log exports to other countries, except Canada.*

[3]*Not available. Commercial (industrial) and noncommercial post production was 4,077 thousand pieces.*

wood suitable for chipping such as slabs, edgings, and veneer cores. The Eastern Ozark Unit produces the highest concentration of residue: 42 percent of the coarse residue and bark and 41 percent of the fine residue.

A comparison by residue class of the percentage used that was generated in 1969 with the same percentage in 1980 shows great progress has been made in finding uses for coarse residue and bark:

Kind of residue	Percent used 1969	1980
Coarse	54	89
Fine	22	37
Bark	[4]45	74

Principal uses in 1980 for coarse residue were in pulp manufacturing (fiber products) and charcoal production. Coarse residue use for fuel was low compared with many States because, in Missouri, the fiber and charcoal markets for this residue are competitive and well established and because roundwood from oak, hickory, and other desirable fuelwood species is readily available.

Some progress has been made since 1969 in increasing the use of fine residue. Primary uses of fine residue are for charcoal, industrial fuel, soil conditioners, mulch, livestock bedding, and poultry litter. Many Missouri mills could increase their competitive position by finding additional uses or new markets for sawdust and other fine residue.

Charcoal and fuelwood are the chief uses for bark. In charcoal manufacturing the bark is merely a supplemental raw material attached to the desired coarse residue.

[4]*Estimate based on ratio of bark to coarse residue used in 1980.*

Finding markets for residue is usually not a problem for larger mills. Unused residue is most likely to be found at smaller mills and some medium-sized mills where residue storage may not be a problem and the volume available may be insufficient to attract customers requiring large quantities. Unused residue is often piled, used for landfill, or burned as waste.

Customers looking for unused residue will find the most in the Eastern Ozark and Prairie Units. More than 100,000 tons of fine residue produced in the Eastern Ozarks was unused in 1980.

OUTLOOK

When economic activity turns up, industrial roundwood production should grow, particularly sawlog production. Sawmills will continue to dominate Missouri forest industry. Charcoal wood and cooperage log production will probably remain near the 1980 level. The number of large and medium sawmills will likely increase as the number of small sawmills declines. As a result, lumber output per mill will continue to rise. More consolidation of production in the charcoal and cooperage industries is likely, leading to a further decline in the number of active mills.

Additional market outlets should become available for fine residue and bark. If current trends continue, more than 90 percent of the fine residue will be used by 1999 and more than 90 percent of the bark by 1985.

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APPENDIX

STUDY METHODS

Data for this publication came from canvassing with a formal questionnaire some of the sawmills and all of the other primary wood-using mills that use Missouri logs and bolts. All canvassing in Missouri (except two pulpmills) was initially done by personal contact, telephone, and mail by the Missouri Department of Conservation, Forestry Division (MDC). For a few Missouri mills that did not furnish complete data, MDC utilization and marketing specialists provided estimates based on prior knowledge and contacts. The North Central Forest Experiment Station (using formal questionnaires) contacted by mail two Missouri pulpmills and all out-of-State mills using Missouri roundwood; follow-up on nonrespondents was by mail and telephone. The Station edited and compiled the data.

Missouri sawmills, cooperage mills, charcoal plants, and preservative plants were stratified into size-classes and sample-sizes as follows:

Sawmills

Size-class (Thousand board feet/year)	Sample-size (Mills)
3,001 +	All
1,001-3,000	1 out of 5
101-1,000	1 out of 10
100-	1 out of 20

Cooperage mills

(Thousand board feet/year)	(Mills)
1,001 +	All
1,000-	1 out of 4

Charcoal plants

(Tons/year)	(Number)
4,001 +	All
2,001-4,000	1 out of 2
2,000-	1 out of 4

Preservative plants

All	1 out of 3

Using a random start for a stratum within a mill type, sample mills were selected within an Inventory Unit, and selection continued within each succeeding Inventory Unit until the sample was complete for that stratum. This procedure was repeated for each stratum. About 18 percent of the sawmills, 63 percent of the cooperage mills, 56 percent of the charcoal plants, and 32 percent of the preservative plants were canvassed. All other mill types were sampled 100 percent.

Logging utilization factors developed from a 1971-1972 study in Missouri were used to estimate growing stock and sawtimber removals for industrial roundwood in 1980.

SAMPLING ERROR

All the reported figures are estimates based on the sampling procedures described above that are designed to give accurate estimates of roundwood production. A measure of reliability of these figures is given by sampling errors. This sampling error means that the chances are two out of three that the results for the sample differ by no more than the amount indicated from the results that would have been obtained if a 100 percent sample had been made. Sampling errors by type of product were:

Type of product	Sampling error (Percent)	Production
Saw logs	± 1.83	405,501 MBF
Cooperage logs	± 9.80	28,473 MBF
Posts	±16.27	2,835,000 pieces
Charcoal wood	± 5.29	88,388 cords

Because all other primary wood-using mills were canvassed, there is no sampling error for the roundwood products they use.

DEFINITION OF TERMS

Timber removals for industrial roundwood.—The volume of sound bole wood (between a 1-foot stump and a minimum top diameter of 4.0 inches outside bark or to a point where the central stem breaks into limbs) in poletimber and sawtimber growing-stock trees on commercial forest land removed annually for industrial roundwood products (including logging residues).

Sawtimber removals for industrial roundwood.—The volume of sound bole wood (between a 1-foot stump and the point on the bole above which a saw log cannot be produced) in sawtimber growing-stock trees on commercial forest land removed annually for industrial roundwood products (including logging residues). The minimum saw log top is 7.0 inches diameter outside bark for softwoods and 9.0 inches diameter outside bark for hardwoods.

Commercial forest land.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization by

statute or administrative regulation. Generally, this includes areas suitable for growing crops of industrial wood in excess of 20 cubic feet per acre annually.

Industrial roundwood products.—Saw logs, pulpwood, veneer logs, commercial posts, cooperage logs, handle bolts, shaving bolts, charcoal bolts, and chips from roundwood. Does not include fuelwood or noncommercial posts.

Industrial roundwood production.—The quantity of industrial roundwood harvested in a geographic area.

Industrial roundwood receipts.—The quantity of industrial roundwood received in a geographic area regardless of the geographic source.

Consumption.—The quantity of a commodity, such as pulpwood, utilized.

Primary forest products industry.—All mills processing roundwood, including chips from roundwood.

Growing-stock trees.—All live poletimber and sawtimber trees of commercial species except rough and rotten trees. Poletimber trees are from 5.0 to 8.9 inches d.b.h. for softwoods and from 5.0 to 10.9 inches d.b.h. for hardwoods. Softwood sawtimber trees are 9.0 inches d.b.h. or larger; hardwood sawtimber trees are 11.0 inches d.b.h. or larger.

Primary wood-using mill residue.—Wood materials (coarse and fine) and bark not utilized for principal products at manufacturing plants using roundwood. These residues include wood products (byproducts) obtained incidental to production of principal products and wood materials not utilized for some product.

Coarse mill residue.—Wood residue suitable for chipping such as slabs, edgings, and veneer cores.

Fine mill residue.—Wood residue not suitable for chipping such as sawdust and veneer clippings.

COMMON AND SCIENTIFIC NAMES OF TREE SPECIES MENTIONED

Softwoods
- Cypress .... *Taxodium distichum* var. *distichum*
- Shortleaf pine ..... *Pinus echinata*
- Eastern redcedar ..... *Juniperus virginiana*

Hardwoods
- Ash
  - White ash ..... *Fraxinus americana*
  - Green ash ..... *Fraxinus pennsylvanica*
  - Blue ash ..... *Fraxinus quadrangulata*
- American basswood ..... *Tilia americana*
- American beech ..... *Fagus grandifolia*
- River birch ..... *Betula nigra*
- Tupelo and blackgum
  - Blackgum ..... *Nyssa sylvatica* var. *biflora*
  - Black tupelo .... *Nyssa sylvatica* var. *sylvatica*
  - Water tupelo ..... *Nyssa aquatica*
- Black cherry ..... *Prunus serotina*
- Eastern cottonwood ..... *Populus deltoides*
- Elm
  - Winged elm ..... *Ulmus alata*
  - American elm ..... *Ulmus americana*
  - Slippery elm ..... *Ulmus rubra*
  - Rock elm ..... *Ulmus thomasii*
- Hickory
  - Pecan ..... *Carya illinoensis*
  - Shellbark hickory ..... *Carya laciniosa*
  - Shagbark hickory ..... *Carya ovata*
  - Mockernut hickory ..... *Carya tomentosa*
  - Water hickory ..... *Carya aquatica*
  - Bitternut hickory ..... *Carya cordiformis*
  - Pignut hickory ..... *Carya glabra* var. *glabra*
  - Black hickory ..... *Carya texana*
- Hard maple
  - Black maple ..... *Acer nigrum*
  - Sugar maple ..... *Acer saccharum*
- Soft maple
  - Red maple ..... *Acer rubrum* var. *rubrum*
  - Silver maple ..... *Acer saccharinum*
- Red oak
  - Cherrybark oak ..... *Quercus falcata* var. *pagodaefolia*
  - Northern red oak ..... *Quercus rubra*
  - Shumard oak ..... *Quercus shumardii* var. *shumardii*
  - Scarlet oak ..... *Quercus coccinea*
  - Southern red oak . *Quercus falcata* var. *falcata*
  - Black oak ..... *Quercus velutina*
  - Shingle oak ..... *Quercus imbricaria*
  - Blackjack oak ..... *Quercus marilandica*
  - Water oak ..... *Quercus nigra*
  - Pin oak ..... *Quercus palustris*
  - Willow oak ..... *Quercus phellos*
- White oak
  - White oak ..... *Quercus alba*
  - Bur oak ..... *Quercus macrocarpa*
  - Swamp chestnut oak ..... *Quercus michauxii*
  - Chinkapin oak ..... *Quercus muehlenbergii*
  - Swamp white oak ..... *Quercus bicolor*
  - Overcup oak ..... *Quercus lyrata*
  - Post oak ..... *Quercus stellata* var. *stellata*
- Sweetgum ..... *Liquidambar styraciflua*
- American sycamore ..... *Tilia americana*
- Black walnut ..... *Juglans nigra*
- Yellow-poplar ..... *Liriodendron tulipifera*

Other hardwoods

Black locust	*Robinia pseudoacacia*
Common persimmon	*Diospyros virginiana*
Flowering dogwood	*Cornus florida*
Honeylocust	*Gleditsia triacanthos*
Red mulberry	*Morus rubra*
Sugarberry	*Celtis laevigata*
Osage-orange	*Maclura pomifera*
Butternut	*Juglans cinerea*
Black willow	*Salix nigra*
Boxelder	*Acer negundo*
Cucumbertree	*Magnolia acuminata*
Hackberry	*Celtis occidentalis*
Kentucky coffeetree	*Gynocladus dioicus*
Northern catalpa	*Catalpa speciosa*
Ohio buckeye	*Aesculus glabra*
Sassafras	*Sassafras albidum*

TABLE TITLES

Table 1.—Industrial roundwood production by type of product and species in Missouri, 1980

Table 2.—Number of active primary wood-using mills in Missouri, 1946, 1958, 1969, and 1980

Table 3.—Industrial roundwood production by species and Inventory Unit in Missouri, 1980

Table 4.—Timber removals from growing stock on commercial forest land for industrial roundwood by species and Inventory Unit in Missouri, 1980

Table 5.—Timber removals from sawtimber on commercial forest land for industrial roundwood by species and Inventory Unit in Missouri, 1980

Table 6.—Saw log production by species in Missouri, 1969 and 1980

Table 7.—Saw log production by Inventory Unit, species, and State of destination, Missouri, 1980

Table 8.—Saw log receipts in Missouri by Inventory Unit, species, and State of origin, 1980

Table 9.—Pulpwood production in Missouri by species groups, 1965, 1970, 1975, and 1980

Table 10.—Charcoal wood production by species and Inventory Unit in Missouri, 1980

Table 11.—Veneer log production in Missouri by species, 1966, 1970, 1976, and 1980

Table 12.—Veneer log production by species and State of destination, Missouri, 1980

Table 13.—Industrial roundwood production by type of product, Inventory Unit, and species group, Missouri, 1980

Table 14.—Residue produced at primary wood-using mills by type of material, type of use, and Inventory Unit, Missouri, 1980

Table.1--Industrial roundwood production by type of product and species in Missouri, 1980

Species	Sawlogs		Veneer logs		Pulpwood		Charcoal wood		Cooperage logs		Posts		Other products	All products
	MBF[1]	MCF[2]	MBF[1]	MCF[2]	Cords[3]	MCF[2]	Cords[3]	MCF[2]	MBF[1]	MCF[2]	Thousand pieces	MCF[2]	MCF[2]	MCF[2]
Softwoods														
Cypress	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shortleaf pine	27,696	4,811	0	0	766	61	613	43	0	0	695	535	0	5,450
Redcedar	3,140	670	0	0	0	0	0	0	0	0	0	0	152	822
Total	30,836	5,481	0	0	766	61	613	43	0	0	695	535	152	6,272
Hardwoods														
Ash	2,976	510	0	0	409	33	633	45	0	0	0	0	4	592
Basswood	257	41	0	0	325	25	0	0	0	0	0	0	0	66
Beech	45	7	0	0	0	0	0	0	0	0	0	0	0	7
Birch	1,922	328	0	0	87	6	0	0	0	0	0	0	4	338
Blackgum	2,191	348	0	0	282	21	498	34	0	0	0	0	1	404
Black cherry	369	59	0	0	209	16	322	22	0	0	0	0	0	97
Cottonwood	21,431	3,307	1,072	245	2,315	182	0	0	0	0	0	0	77	3,811
Elm	1,569	247	0	0	1,281	99	823	56	0	0	0	0	0	402
Pecan (hickory)	220	38	62	14	0	0	0	0	0	0	0	0	0	52
Other hickory	12,770	2,182	32	7	0	0	4,453	310	0	0	0	0	198	2,697
Hard maple	3,031	517	0	0	139	9	362	26	0	0	0	0	0	552
Soft maple	6,088	967	0	0	2,789	219	191	12	0	0	0	0	77	1,275
Red oak	228,984	40,876	0	0	6,447	509	49,392	3,459	0	0	1,750	1,007	1	45,852
White oak	56,395	10,067	975	224	6,899	545	28,879	2,023	28,473	4,693	375	217	4	17,773
Sweetgum	7,772	1,234	0	0	106	7	0	0	0	0	0	0	0	1,241
Sycamore	12,237	1,942	57	13	2,602	206	1,922	134	0	0	12	6	8	2,309
Black walnut	15,448	3,384	1,075	233	0	0	300	21	0	0	0	0	0	3,638
Yellow-poplar	785	125	0	0	28	1	0	0	0	0	0	0	0	126
Other hardwoods	175	28	2	0	0	0	0	0	0	0	3	1	25	54
Total	374,665	66,207	3,275	736	23,918	1,878	87,775	6,142	28,473	4,693	2,140	1,231	399	81,286
All species	405,501	71,688	3,275	736	24,684	1,939	88,388	6,185	28,473	4,693	2,835	1,766	551	87,558

[1]/Thousand board feet, International 1/4-inch rule.

[2]/Thousand cubic feet.

[3]/Standard cords, unpeeled.

Table 2.--Number of active primary wood-using mills in Missouri, 1946, 1958, 1969, and 1980

Kind of mill[1]	1946	1958	1969	1980
Sawmills				
Large[2]	2	5	7	8
Medium[3]	43	103	117	163
Small	2,548	882	425	315
Subtotal	2,593	990	549	486
Cooperage mills	85	36	36	30
Veneer mills	6	3	4	4
Pulp mills	-	2	2	2
Charcoal plants	3	60	52	36
Handle mills	19	12	7	10
Treating plants	6	14	22	28
Miscellaneous[4]	94	44	9	3
Total	2,806	1,161	681	599

[1] Number of active sawmills estimated in 1980.

[2] Annual lumber production of 5 million board feet or more.

[3] Annual lumber production of 1.000 to 4.999 million board feet.

[4] Includes excelsior mills, novelty plants, shaving mills, etc.

Table 3.--Industrial roundwood production by species and Inventory Unit in Missouri, 1980

(In thousand cubic feet)

Species	All Units	Eastern Ozarks Unit	Southwestern Ozarks Unit	Northwestern Ozarks Unit	Prairie Unit	River-border Unit
Softwoods						
Shortleaf pine	5,450	3,642	1,633	88	0	87
Redcedar	822	18	506	213	0	85
Total	6,272	3,660	2,139	301	0	172
Hardwoods						
Ash	592	57	16	98	170	251
Basswood	66	0	2	1	61	2
Beech	7	0	0	1	4	2
Birch	338	3	8	10	268	49
Blackgum	404	276	76	20	4	28
Black cherry	97	37	14	8	17	21
Cottonwood	3,811	52	9	78	2,467	1,205
Elm	402	120	59	49	125	49
Pecan (hickory)	52	5	0	25	16	6
Other hickory	2,697	1,161	425	298	398	415
Hard maple	552	247	48	50	48	159
Soft maple	1,275	85	39	108	689	354
Red oak	45,852	24,949	8,377	5,564	3,742	3,220
White oak	17,773	7,963	2,357	2,404	2,740	2,309
Sweetgum	1,241	1	0	670	548	22
Sycamore	2,309	589	287	289	659	485
Black walnut	3,638	429	782	693	1,546	188
Yellow-poplar	126	0	0	0	44	82
Other hardwoods	54	1	1	3	48	1
Total	81,286	35,975	12,500	10,369	13,594	8,848
All species	87,558	39,635	14,639	10,670	13,594	9,020

Table 4.--Timber removals from growing stock on commercial forest land for industrial roundwood by species and Inventory Unit in Missouri, 1980

(In thousand cubic feet)

Species	All Units	Eastern Ozarks Unit	Southwestern Ozarks Unit	Northwestern Ozarks Unit	Prairie Unit	Riverborder Unit
Softwoods						
Shortleaf pine	5,756	3,861	1,739	60	0	96
Redcedar	836	18	508	222	0	88
Total	6,592	3,879	2,247	282	0	184
Hardwoods						
Ash	694	58	22	108	206	300
Basswood	57	0	2	1	52	2
Beech	10	0	0	1	6	3
Birch	429	4	10	13	338	64
Blackgum	362	252	63	19	4	24
Black cherry	75	24	11	8	13	19
Cottonwood	4,281	60	10	89	2,768	1,354
Elm	325	100	46	40	102	37
Pecan (hickory)	61	5	0	31	19	6
Other hickory	3,221	1,414	518	274	509	506
Hard maple	677	316	62	49	61	189
Soft maple	1,168	81	38	99	616	334
Red oak	37,911	20,597	6,950	4,441	3,253	2,670
White oak	15,617	6,585	2,169	2,100	2,627	2,136
Sweetgum	1,188	1	0	642	525	20
Sycamore	2,079	508	266	262	596	447
Black walnut	1,738	203	372	331	740	92
Yellow-poplar	121	0	0	0	42	79
Other hardwoods	55	1	1	3	49	1
Total	70,069	30,209	10,540	8,511	12,526	8,283
All species	76,661	34,088	12,787	8,793	12,526	8,467

Table 5.--Timber removals from sawtimber on commercial forest land for industrial roundwood by species and Inventory Unit in Missouri, 1980

(In thousand board feet)[1/]

Species	All Units	Eastern Ozarks Unit	Southwestern Ozarks Unit	Northwestern Ozarks Unit	Prairie Unit	Riverborder Unit
Softwoods						
Shortleaf pine	28,746	19,342	8,851	36	0	517
Redcedar	3,897	81	2,313	1,086	0	417
Total	32,643	19,423	11,164	1,122	0	934
Hardwoods						
Ash	3,283	256	102	502	989	1,434
Basswood	304	0	13	7	278	6
Beech	48	0	0	7	27	14
Birch	2,071	21	45	64	1,632	309
Blackgum	2,046	1,438	344	107	26	131
Black cherry	386	114	54	44	69	105
Cottonwood	24,513	348	61	526	16,008	7,570
Elm	1,722	560	250	221	508	183
Pecan (hickory)	295	23	0	153	91	28
Other hickory	14,893	6,657	2,436	1,195	2,456	2,149
Hard maple	3,240	1,527	301	215	296	901
Soft maple	6,519	475	219	571	3,331	1,923
Red oak	141,613	76,999	25,986	16,153	12,442	10,033
White oak	65,108	26,529	9,318	8,667	11,404	9,190
Sweetgum	6,940	9	0	3,754	3,069	108
Sycamore	11,677	2,825	1,506	1,484	3,314	2,548
Black walnut	7,795	894	1,669	1,488	3,329	415
Yellow-poplar	704	0	0	0	245	459
Other hardwoods	305	3	9	17	271	5
Total	293,462	118,678	42,313	35,175	59,785	37,511
All species	326,105	138,101	53,477	36,297	59,785	38,445

[1/] International 1/4-inch rule.

Table 6.--Saw log production by species in Missouri, 1969 and 1980

(In thousand board feet)[1/]

Species	1969	1980	Change
Softwoods			
Cypress	187	0	-187
Shortleaf pine	15,235	27,696	12,461
Redcedar	2,567	3,140	573
Other softwoods	489	0	-489
Total	18,478	30,836	12,358
Hardwoods			
Ash	3,549	2,976	-573
Basswood	309	257	-52
Beech	273	45	228
Birch	484	1,922	1,438
Blackgum	2,750	2,191	-559
Black cherry	146	369	223
Cottonwood	24,557	21,431	-3,126
Elm	6,123	1,569	-4,554
Hickory[2/]	15,060	12,990	-2,070
Hard maple	1,670	3,031	1361
Soft maple	15,888	6,088	-9,800
Red oak	184,852	228,984	44,132
White oak	66,265	56,395	-9,870
Sweetgum	3,306	7,772	4,466
Sycamore	20,190	12,237	-7,953
Black walnut	12,593	15,448	2,855
Yellow-poplar	958	785	-173
Other hardwoods	1979	175	-1804
Total	360,952	374,665	13,713
All species	379,430	405,501	26,071

[1/] International 1/4-inch rule.

[2/] Includes pecan hickories.

Table 7.--Saw log production by Inventory Unit, species, and State of destination, Missouri, 1980

(In thousand board feet)[1/]

	ALL UNITS					
Species	Total	Missouri	Iowa	Kansas	Kentucky	Other States
Softwoods						
Cypress	0	0	0	0	0	0
Shortleaf pine	27,696	27,398	0	0	0	298
Redcedar	3,140	3,140	0	0	0	0
Total	30,836	30,538	0	0	0	298
Hardwoods						
Ash	2,976	2,917	59	0	0	0
Basswood	257	205	52	0	0	0
Beech	45	45	0	0	0	0
Birch	1,922	1,884	38	0	0	0
Blackgum	2,191	2,191	0	0	0	0
Black cherry	369	365	4	0	0	0
Cottonwood	21,431	20,917	399	32	0	83
Elm	1,569	1,536	33	0	0	0
Pecan (hickory)	220	220	0	0	0	0
Other hickory	12,770	12,644	109	11	0	6
Hard maple	3,031	3,012	19	0	0	0
Soft maple	6,088	5,426	574	88	0	0
Red oak	228,984	228,327	540	76	0	41
White oak	56,395	55,674	666	23	28	4
Sweetgum	7,772	7,769	0	0	0	3
Sycamore	12,237	12,230	7	0	0	0
Black walnut	15,448	11,773	46	2,967	442	220
Yellow-poplar	785	785	0	0	0	0
Other hardwoods	175	100	63	12	0	0
Total	374,665	368,020	2,609	3,209	470	357
All species	405,501	398,558	2,609	3,209	470	655

(Table 7 continued)

(Table 7 continued)

EASTERN OZARK UNIT

Species	Total	Missouri	Iowa	Kansas	Kentucky	Other States
Softwoods						
Cypress	0	0	0	0	0	0
Shortleaf pine	18,626	18,328	0	0	0	298
Redcedar	84	84	0	0	0	0
Total	18,710	18,412	0	0	0	298
Hardwoods						
Ash	218	218	0	0	0	0
Basswood	0	0	0	0	0	0
Beech	0	0	0	0	0	0
Birch	15	15	0	0	0	0
Blackgum	1,557	1,557	0	0	0	0
Black cherry	116	116	0	0	0	0
Cottonwood	328	328	0	0	0	0
Elm	594	594	0	0	0	0
Pecan (hickory)	0	0	0	0	0	0
Other hickory	5,991	5,988	0	0	0	3
Hard maple	1,442	1,442	0	0	0	0
Soft maple	525	525	0	0	0	0
Red oak	125,132	125,091	0	0	0	41
White oak	26,049	26,049	0	0	0	0
Sweetgum	3	0	0	0	0	3
Sycamore	3,076	3,076	0	0	0	0
Black walnut	1,825	1,759	0	0	66	0
Yellow-poplar	0	0	0	0	0	0
Other hardwoods	4	4	0	0	0	0
Total	166,875	166,762	0	0	66	47
All species	185,585	185,174	0	0	66	345

(Table 7 continued on next page)

(Table 7 continued)

SOUTHWEST OZARK UNIT

Species	Total	Missouri	Iowa	Kansas	Kentucky	Other States
Softwoods						
Cypress	0	0	0	0	0	0
Shortleaf pine	8,566	8,566	0	0	0	0
Redcedar	2,241	2,241	0	0	0	0
Total	10,807	10,807	0	0	0	0
Hardwoods						
Ash	91	91	0	0	0	0
Basswood	15	15	0	0	0	0
Beech	0	0	0	0	0	0
Birch	43	43	0	0	0	0
Blackgum	377	377	0	0	0	0
Black cherry	58	58	0	0	0	0
Cottonwood	58	58	0	0	0	0
Elm	272	272	0	0	0	0
Pecan (hickory)	0	0	0	0	0	0
Other hickory	2,201	2,201	0	0	0	0
Hard maple	285	285	0	0	0	0
Soft maple	247	247	0	0	0	0
Red oak	42,805	42,805	0	0	0	0
White oak	7,321	7,321	0	0	0	0
Sweetgum	0	0	0	0	0	0
Sycamore	1,620	1,620	0	0	0	0
Black walnut	3,474	3,413	0	0	61	0
Yellow-poplar	0	0	0	0	0	0
Other hardwoods	10	10	0	0	0	0
Total	58,877	58,816	0	0	61	0
All species	69,684	69,623	0	0	61	0

(Table 7 continued)

(Table 7 continued)

NORTHWEST OZARK UNIT

Species	Total	Missouri	Iowa	Kansas	Kentucky	Other States
Softwoods						
Cypress	0	0	0	0	0	0
Shortleaf pine	0	0	0	0	0	0
Redcedar	531	531	0	0	0	0
Total	531	531	0	0	0	0
Hardwoods						
Ash	467	467	0	0	0	0
Basswood	8	8	0	0	0	0
Beech	7	7	0	0	0	0
Birch	60	60	0	0	0	0
Blackgum	121	121	0	0	0	0
Black cherry	50	50	0	0	0	0
Cottonwood	480	480	0	0	0	0
Elm	243	243	0	0	0	0
Pecan (hickory)	145	145	0	0	0	0
Other hickory	1,050	1,050	0	0	0	0
Hard maple	198	198	0	0	0	0
Soft maple	613	613	0	0	0	0
Red oak	24,479	24,479	0	0	0	0
White oak	7,097	7,097	0	0	0	0
Sweetgum	4,218	4,218	0	0	0	0
Sycamore	1,640	1,640	0	0	0	0
Black walnut	3,106	2,842	0	221	43	0
Yellow-poplar	0	0	0	0	0	0
Other hardwoods	10	10	0	0	0	0
Total	43,992	43,728	0	221	43	0
All species	44,523	44,259	0	221	43	0

(Table 7 continued on next page)

(Table 7 continued)

PRAIRIE UNIT

Species	Total	Missouri	Iowa	Kansas	Kentucky	Other States
Ash	881	822	59	0	0	0
Basswood	230	178	52	0	0	0
Beech	25	25	0	0	0	0
Birch	1,513	1,475	38	0	0	0
Blackgum	29	29	0	0	0	0
Black cherry	38	34	4	0	0	0
Cottonwood	14,221	13,707	399	32	0	83
Elm	319	286	33	0	0	0
Pecan (hickory)	70	70	0	0	0	0
Other hickory	2,328	2,208	109	11	0	0
Hard maple	273	254	19	0	0	0
Soft maple	2,594	1,932	574	88	0	0
Red oak	20,303	19,687	540	76	0	0
White oak	9,136	8,447	666	23	0	0
Sweetgum	3,450	3,450	0	0	0	0
Sycamore	3,200	3,193	7	0	0	0
Black walnut	6,505	3,504	46	2,746	173	36
Yellow poplar	276	276	0	0	0	0
Other hardwoods	147	72	63	12	0	0
All species	65,538	59,649	2,609	2,988	173	119

(Table 7 continued)

(Table 7 continued)

RIVERBORDER UNIT

Species	Total	Missouri	Iowa	Kansas	Kentucky	Other States
Softwoods						
Cypress	0	0	0	0	0	0
Shortleaf pine	504	504	0	0	0	0
Redcedar	284	284	0	0	0	0
Total	788	788	0	0	0	0
Hardwoods						
Ash	1,319	1,319	0	0	0	0
Basswood	4	4	0	0	0	0
Beech	13	13	0	0	0	0
Birch	291	291	0	0	0	0
Blackgum	107	107	0	0	0	0
Black cherry	107	107	0	0	0	0
Cottonwood	6,344	6,344	0	0	0	0
Elm	141	141	0	0	0	0
Pecan (hickory)	5	5	0	0	0	0
Other hickory	1,200	1,197	0	0	0	3
Hard maple	833	833	0	0	0	0
Soft maple	2,109	2,109	0	0	0	0
Red oak	6,265	16,265	0	0	0	0
White oak	6,792	6,760	0	0	28	4
Sweetgum	101	101	0	0	0	0
Sycamore	2,701	2,701	0	0	0	0
Black walnut	538	255	0	0	99	184
Yellow-poplar	509	509	0	0	0	0
Other hardwoods	4	4	0	0	0	0
Total	39,383	39,065	0	0	127	191
All species	40,171	39,853	0	0	127	191

[1/] International 1/4-inch rule.

Table 8.--Saw log receipts in Missouri by Inventory Unit, species, and State of origin, 1980

(In thousand board feet) 1/

Species	All States	Missouri	Illinois	Indiana	Arkansas	Kansas	Iowa	Oklahoma	Nebraska
	ALL UNITS								
Softwoods									
Shortleaf pine	27,398	27,398	0	0	0	0	0	0	0
Redcedar	3,140	3,140	0	0	0	0	0	0	0
Total	30,538	30,538	0	0	0	0	0	0	0
Hardwoods									
Ash	3,264	2,917	291	48	0	8	0	0	0
Basswood	212	205	6	0	0	1	0	0	0
Beech	171	45	125	0	0	1	0	0	0
Birch	2,129	1,884	241	0	1	3	0	0	0
Blackgum	2,191	2,191	0	0	0	0	0	0	0
Black cherry	390	365	16	9	0	0	0	0	0
Cottonwood	21,024	20,917	44	0	1	62	0	0	0
Elm	1,569	1,536	30	0	0	3	0	0	0
Pecan (hickory)	226	220	5	0	0	1	0	0	0
Other hickory	12,937	12,644	240	0	47	6	0	0	0
Hard maple	3,255	3,012	243	0	0	0	0	0	0
Soft maple	6,104	5,426	673	0	0	5	0	0	0
Red oak	234,013	228,327	4,148	425	818	295	0	0	0
White oak	59,857	55,674	2,353	1,531	253	46	0	0	0
Sweetgum	7,869	7,769	100	0	0	0	0	0	0
Sycamore	12,296	12,230	25	0	11	30	0	0	0
Black walnut	14,363	11,773	48	0	348	776	653	519	246
Yellow-poplar	1,216	785	431	0	0	0	0	0	0
Other hardwoods	100	100	0	0	0	0	0	0	0
Total	383,186	368,020	9,019	2,013	1,479	1,237	653	519	246
All species	413,724	398,558	9,019	2,013	1,479	1,237	653	519	246

(Table 8 continued on next page)

(Table 8 continued)

EASTERN OZARK UNIT

Species	All States	Missouri	Arkansas
Softwoods			
Shortleaf pine	17,729	17,729	0
Redcedar	77	77	0
Total	17,806	17,806	0
Hardwoods			
Ash	25	25	0
Blackgum	1,399	1,399	0
Black cherry	102	102	0
Cottonwood	248	248	0
Elm	439	439	0
Other hickory	5,852	5,844	8
Hard maple	1,325	1,325	0
Soft maple	489	489	0
Red oak	120,756	120,490	266
White oak	25,606	25,540	66
Sycamore	2,758	2,758	0
Black walnut	142	134	8
Total	159,141	158,793	348
All species	176,947	176,599	348

(Table 8 continued)

(Table 8 continued)

SOUTHWEST OZARK UNIT

Species	All States	Missouri	Arkansas	Oklahoma
Softwoods				
Shortleaf pine	8,695	8,695	0	0
Redcedar	2,241	2,241	0	0
Total	10,936	10,936	0	0
Hardwoods				
Ash	237	237	0	0
Basswood	14	14	0	0
Birch	80	79	1	0
Blackgum	558	558	0	0
Black cherry	94	94	0	0
Cottonwood	159	158	1	0
Elm	421	421	0	0
Other hickory	2,458	2,419	39	0
Hard maple	368	368	0	0
Soft maple	252	252	0	0
Red oak	50,910	50,358	552	0
White oak	8,392	8,205	187	0
Sycamore	2,525	2,514	11	0
Black walnut	5,878	5,198	340	340
Yellow-poplar	276	276	0	0
Total	72,622	71,151	1,131	340
All species	83,558	82,087	1,131	340

(Table 8 continued on next page)

(Table 8 continued)

NORTHWEST OZARK UNIT

Species	All States	Missouri
Softwoods		
Redcedar	531	531
Total	531	531
Hardwoods		
Ash	280	280
Blackgum	70	70
Cottonwood	280	280
Elm	350	350
Pecan (hickory)	192	192
Other hickory	1,026	1,026
Soft maple	745	745
Red oak	19,960	19,960
White oak	6,179	6,179
Sweetgum	4,218	4,218
Sycamore	811	811
Black walnut	20	20
Total	34,131	34,131
All species	34,662	34,662

(Table 8 continued)

(Table 8 continued)

PRAIRIE UNIT

Species	All States	Missouri	Illinois	Kansas	Iowa	Nebraska	Oklahoma
Ash	546	486	52	8	0	0	0
Basswood	198	191	6	1	0	0	0
Beech	33	32	0	1	0	0	0
Birch	1,880	1,637	240	3	0	0	0
Black cherry	5	5	0	0	0	0	0
Cottonwood	13,744	13,662	20	62	0	0	0
Elm	155	152	0	3	0	0	0
Pecan (hickory)	24	23	0	1	0	0	0
Other hickory	2,186	2,180	0	6	0	0	0
Hard maple	50	34	16	0	0	0	0
Soft maple	2,427	2,022	400	5	0	0	0
Red oak	19,932	18,846	791	295	0	0	0
White oak	8,993	8,419	528	46	0	0	0
Sweetgum	3,450	3,450	0	0	0	0	0
Sycamore	3,005	2,975	0	30	0	0	0
Black walnut	8,056	6,186	16	776	653	246	179
Other hardwood	100	100	0	0	0	0	0
All species	64,784	60,400	2,069	1,237	653	246	179

(Table 8 continued on next page)

(Table 8 continued)

Species	RIVERBORDER UNIT All States	Missouri	Illinois	Indiana
Softwoods				
Shortleaf pine	974	974	0	0
Redcedar	291	291	0	0
Total	1,265	1,265	0	0
Hardwoods				
Ash	2,176	1,889	239	48
Beech	138	13	125	0
Birch	169	168	1	0
Blackgum	164	164	0	0
Black cherry	189	164	16	9
Cottonwood	6,593	6,569	24	0
Elm	204	174	30	0
Pecan (hickory)	10	5	5	0
Other hickory	1,415	1,175	240	0
Hard maple	1,512	1,285	227	0
Soft maple	2,191	1,918	273	0
Red oak	22,455	18,673	3,357	425
White oak	10,687	7,331	1,825	1,531
Sweetgum	201	101	100	0
Sycamore	3,197	3,172	25	0
Black walnut	267	235	32	0
Yellow poplar	940	509	431	0
Total	52,508	43,545	6,950	2,013
All species	53,773	44,810	6,950	2,013

1/ International 1/4 - inch rule.

Table 9.--Pulpwood production in Missouri by species groups, 1965, 1970, 1975, and 1980

(In standard cords, unpeeled)

Species group	1965	1970	1975	1980
Roundwood				
Softwoods	253	301	187	766
Soft hardwoods	17,299	15,753	12,955	9,937
Hard hardwoods	2,427	9,714	9,854	13,981
Total	19,979	25,768	22,996	24,684
Residue				
Softwood	0	626	4,540	2,324
Hardwood	2,146	55,725	88,782	78,427
Total	2,146	56,351	93,322	80,751
All material	22,125	82,119	116,318	105,435

Table 10.- Charcoal wood production by species and Inventory Unit in Missouri, 1980

(In standard cords)

Species	All units	Eastern Ozarks	South-West Ozarks	North-West Ozarks	Prairie	River-border
Roundwood						
Shortleaf pine	613	460	153	0	0	0
Ash	633	186	0	265	0	182
Blackgum	498	263	235	0	0	0
Black cherry	322	247	75	0	0	0
Elm	823	301	235	159	0	128
Hickory	4,453	1,294	471	1,620	0	1,068
Hard maple	362	0	0	228	0	134
Soft maple	191	22	0	101	0	68
Red oak	49,392	28,976	9,293	7,679	0	3,444
White oak	28,879	20,002	3,038	4,117	0	1,722
Sycamore	1,922	1,214	248	322	0	138
Black walnut	300	225	75	0	0	0
Total	88,388	53,190	13,823	14,491	0	6,884
Residue						
Softwood	11,213	6,484	4,729	0	0	0
Hardwood	141,559	74,746	43,300	23,243	270	0
Total	152,772	81,230	48,029	23,243	270	0
All material	241,160	134,420	61,852	37,734	270	6,884

Table 11.--Veneer log production in Missouri by species, 1966, 1970, 1976, and 1980

(In thousand board feet)[1/]

Species	1966	1970	1976	1980
Ash	153	28	23	0
Gum	58	39	7	0
Black cherry	1	0	0	0
Cottonwood	2,122	705	110	1,072
Elm	[2/]	22	0	0
Hickory	177	629	187	94
Hard maple	97	0	0	0
Soft maple	98	121	53	0
Red oak	96	39	12	0
White oak	100	30	867	975
Sycamore	223	104	6	57
Black walnut	2,765	1,218	1,345	1,075
Yellow-poplar	1	46	25	0
Other hardwoods	638[3/]	14	0	2
All species	6,529	2,995	2,635	3,275

[1/] International 1/4-inch rule.

[2/] Included in other hardwoods.

[3/] Includes elm.

Table 12.-- Veneer log production by species and State of destination, Missouri, 1980

(In thousand board feet)[1/]

Species	Missouri	Indiana	Illinois	Ohio	Total
Cottonwood	1,072	0	0	0	1,072
Pecan (hickory)	0	62	0	0	62
Other hickory	0	32	0	0	32
White oak	704	147	124	0	975
Sycamore	57	0	0	0	57
Black walnut	344	554	154	23	1,075
Other hardwoods	0	2	0	0	2
All species	2,177	797	278	23	3,275

[1/] International 1/4-inch rule.

Table 13.--Industrial roundwood production by type of product, Inventory Unit, and species group, Missouri, 1980

Product and species group	Unit of measure	All Units	Eastern Ozarks Unit	Southwestern Ozarks Unit	Northwestern Ozarks Unit	Prairie Unit	Riverborder Unit
Saw logs	MBF[1/]						
Softwoods		30,836	18,710	10,807	531	0	788
Hardwoods		374,665	166,875	58,877	43,992	65,538	39,383
Total		405,501	185,585	69,684	44,523	65,538	40,171
Veneer logs	MBF[1/]						
Hardwoods		3,275	83	130	383	1,113	1,566
Pulpwood	Cords[2/]						
Softwoods		766	766	0	0	0	0
Hardwoods		23,918	7,407	0	0	11,248	5,263
Total		24,684	8,173	0	0	11,248	5,263
Charcoal wood	Cords[2/]						
Softwoods		613	460	153	0	0	0
Hardwoods		87,775	52,730	13,670	14,491	0	6,884
Total		88,388	53,190	13,823	14,491	0	6,884
Cooperage logs	MBF[1/]						
Hardwood		28,473	9,923	4,959	3,818	5,431	4,342
Posts	M pieces[3/]						
Softwoods		695	407	174	114	0	0
Hardwoods		2,140	554	178	1,408	0	0
Total		2,835	961	352	1,522	0	0
Other	MCF[4/]						
Softwoods		152	0	28	99	0	25
Hardwoods		399	51	21	15	183	129
Total		551	51	49	114	183	154
All products	MCF[4/]						
Softwoods		6,272	3,660	2,139	301	0	172
Hardwoods		81,286	35,975	12,500	10,369	13,594	8,848
Total		87,558	39,635	14,639	10,670	13,594	9,020

[1/] Thousand board feet, International 1/4-inch rule.

[2/] Standard cords, unpeeled.

[3/] Thousand pieces.

[4/] Thousand cubic feet.

Table 14.--Residue produced at primary wood-using mills by type of material, type of use, and Inventory Unit, Missouri, 1980

(In thousand tons green weight)

Unit and type of use	Wood residue							
	Total		Coarse[1]		Fine[2]		Bark[3]	
	softwood	hardwood	softwood	hardwood	softwood	hardwood	softwood	hardwood
Eastern Ozark Unit								
Fiber products	7.27	74.11	7.27	74.11	0	0	.36	0
Charcoal	12.66	146.04	9.98	126.54	2.68	19.50	3.72	50.89
Industrial fuel	1.47	17.21	0	.34	1.47	16.87	1.03	10.95
Domestic fuel	.08	3.86	.08	3.86	0	0	.02	1.67
Miscellaneous [4]	1.02	5.31	0	.24	1.02	5.07	.81	4.71
Not used	15.25	119.58	6.51	19.31	8.74	100.27	4.80	29.36
Total	37.75	366.11	23.84	224.40	13.91	141.71	10.74	97.58
Southwest Ozark Unit								
Fiber products	.87	1.38	.87	1.38	0	0	0	0
Charcoal	9.23	84.61	8.96	83.26	.27	1.35	3.82	34.84
Industrial fuel	.17	6.73	.17	3.68	0	3.05	.04	1.57
Domestic fuel	1.34	8.59	1.34	8.59	0	0	.46	3.57
Miscellaneous [4]	3.04	22.31	.62	0	2.42	22.31	.89	.15
Not used	8.52	33.99	2.68	1.83	5.84	32.16	1.08	1.86
Total	23.17	157.61	14.64	98.74	8.53	58.87	6.29	41.99
Northwest Ozark Unit								
Charcoal	0	45.43	0	45.43	0	0	0	20.01
Industrial fuel	.03	0	.03	0	0	0	0	0
Domestic fuel	.58	3.28	.58	3.28	0	0	.14	2.02
Miscellaneous [4]	.43	10.33	.03	0	.40	10.33	.01	1.72
Not used	.07	33.42	.07	4.65	0	28.77	.02	2.53
Total	1.11	92.46	.71	53.36	.40	39.10	.17	26.28
Prairie Unit								
Fiber products	0	43.47	0	43.47	0	0	0	.71
Charcoal	0	.53	0	.53	0	0	0	.22
Industrial fuel	0	4.19	0	0	0	4.19	0	2.76
Domestic fuel	0	20.08	0	20.08	0	0	0	8.06
Miscellaneous [4]	0	12.77	0	0	0	12.77	0	4.21
Not used	0	73.37	0	29.20	0	44.17	0	25.13
Total	0	154.41	0	93.28	0	61.13	0	41.09
Riverborder Unit								
Fiber products	1.30	64.04	1.30	64.04	0	0	0	0
Industrial fuel	.01	12.95	.01	1.19	0	11.76	0	7.28
Domestic fuel	.36	9.39	.36	9.39	0	0	.09	4.09
Miscellaneous [4]	.26	23.09	.02	.74	.24	22.35	.05	19.12
Not used	.76	19.86	0	1.90	.76	17.96	.49	2.91
Total	2.69	129.33	1.69	77.26	1.00	52.07	.63	33.40
All Units								
Fiber products	9.44	183.00	9.44	183.00	0	0	.36	.71
Charcoal	21.89	276.61	18.94	255.76	2.95	20.85	7.54	105.96
Industrial fuel	1.68	41.08	.21	5.21	1.47	35.87	1.07	22.56
Domestic fuel	2.36	45.20	2.36	45.20	0	0	.71	19.41
Miscellaneous [4]	4.75	73.81	.67	.98	4.08	72.83	1.76	29.91
Not used	24.60	280.22	9.26	56.89	15.34	223.33	6.39	61.79
Total	64.72	899.92	40.88	547.04	23.84	352.88	17.83	240.34

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark at pulpmills.

[4] Livestock bedding, mulch, small dimension, and specialty items.

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Primary forest products industry and timber use, Missouri, 1980. Resour. Bull. NC-71. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1983. 22 p.

Discusses recent Missouri forest industry trends; timber removals for industrial roundwood in 1980; and production and receipts of saw logs, pulpwood, cooperage logs, charcoal wood, and other industrial roundwood products. Reports on associated primary mill wood and bark residue and the disposition of mill residue.

KEY WORDS: Saw logs, pulpwood, cooperage, charcoal, mill residue, timber removals

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Bulletin **NC-72**

Michigan's Fourth Forest Inventory: Timber Volumes and Projections of Timber Supply

John S. Spencer, Jr. and Jerold T. Hahn

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Information contained in this report includes the most commonly used Forest Inventory and Analysis (FIA) statistics. However, additional forest resource data can be provided to interested users. Persons requesting additional information that can be provided from the raw inventory data are expected to pay for the retrieval costs. These costs will vary depending on the complexity of the request, from less than $100 for a relatively simple request to $2,000 for a complete retrieval involving the services of a FIA computer programmer. If requests for data conflict with ongoing work, requests will be scheduled so as to minimize the impact on the work unit.

Requests for unpublished information may be directed to:

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Area served: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, Wisconsin.

FOREWORD

Forest Inventory and Analysis (formerly called Resources Evaluation) is a continuing endeavor as mandated by the Forest and Rangeland Renewable Resources Planning Act of 1974, the precursor of which is the McSweeney-McNary Forest Research Act of 1928. The objective of Forest Inventory and Analysis is to periodically inventory the Nation's forest land to determine its extent, condition, and volume, growth, and depletions of timber. The research branch of the USDA Forest Service is responsible for conducting these inventories and publishing summary reports for individual States. The North Central Forest Experiment Station is responsible for Forest Inventory and Analysis work done in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, and Wisconsin. Up-to-date resource information is essential for framing forest policies and programs.

Fieldwork for the 1980 Michigan forest inventory began in October 1977 and was completed in May 1981. This is the fourth survey of Michigan's timber resource—the three previous surveys were made in 1935 (USDA Forest Service 1936), 1955 (Findell *et al.* 1960), and 1966 (Chase *et al.* 1970).

Resource Bulletins reporting statistical highlights and detailed tables of the four Survey Units in Michigan are available from the North Central Forest Experiment Station and the Michigan Department of Natural Resources in Lansing. This publication is one of an additional series of reports that analyze the State's timber resource.

More accurate survey information was obtained during the 1980 survey than otherwise would have been feasible because of intensified field sampling. Such sampling was made possible by additional funding and personnel provided the North Central Station by the Michigan State Legislature through the Department of Natural Resources and by interested forest industries. Data from the Department's canvass of all primary wood-using plants in the State were used to help estimate the quantity of timber products harvested in Michigan.

The Michigan Department of Natural Resources and the National Forests furnished aerial photos used in the Michigan Forest Inventory.

HIGHLIGHTS

Volume

Volume of growing stock on commercial forest land increased from 15.1 to 19.1 billion cubic feet between 1966 and 1980, a 27-percent increase.

Softwood growing-stock volume increased 34 percent between inventories; hardwood volume gained 24 percent.

The Northern Lower Peninsula Inventory Unit contains the largest volume with 6.8 billion cubic feet, or 36 percent of the State's growing-stock volume.

The volume of rough and rotten trees, short-log trees, and salvable dead trees totals 2.1 billion cubic feet.

Sugar maple, with 2.7 billion cubic feet, is the leading species in terms of growing-stock volume.

Seventy-two percent of the growing-stock volume is in trees 12 inches in diameter and smaller.

Nonindustrial private parties own 53 percent of the growing-stock volume.

Average growing-stock volume per acre increased from 798 cubic feet in 1966 to 1,092 cubic feet in 1980.

Thirty-one percent of the growing-stock volume is in stands aged 41 to 60 years.

Sixty-nine percent of the sawtimber volume is in grade 3 saw logs. The small average diameter of sawtimber trees automatically places many into this log grade.

Stand Conditions

Net annual growth increased from 505 million cubic feet in 1965 to 678 million cubic feet in 1979, a 34-percent gain.

The growth rate was 3.5 percent of inventory in 1979, compared to 3.4 percent in 1965. The 1979 softwood rate was 3.8 percent and the hardwood rate was 3.4 percent.

Average net annual growth per acre increased from 26.8 cubic feet in 1965 to 38.8 cubic feet in 1979.

Mortality of growing-stock trees in 1979 amounted to 158 million cubic feet, 0.8 percent of inventory.

Diseases caused the most mortality—62 million cubic feet or 39 percent of the total.

Timber Use

- Timber removals from growing stock increased from 240 million cubic feet in 1965 to 275 million cubic feet in 1979, a 15-percent gain.
- Sawtimber removals were unchanged between inventories, at 916 million board feet.
- Aspen removals amounted to 30 percent of the total, the largest share, even though aspen comprises only 14 percent of the growing-stock inventory.
- Roundwood products accounted for 81 percent of growing-stock removals, other removals for 13 percent, and logging residue for 6 percent.
- Pulpwood (47 percent) and saw logs (42 percent) account for most of the removals for roundwood products.
- Private land supplied 77 percent of the removals from growing stock, although it contained only 65 percent of the inventory.

Biomass

- Live shrub biomass (including trees less than 1 inch d.b.h.) was highest in the tamarack forest type—4,533 pounds per acre (green weight) in 1980.
- Live tree biomass (trees greater than 1 inch d.b.h.) totaled 1.0 billion green tons (an average of 60 tons per acre) in 1980.
- Highest per acre yields of live tree biomass (green weight) are in the maple-birch type (74 tons) the oak-hickory type (65 tons), the northern white-cedar type (63 tons), and the paper birch type (62 tons).

Projections

- The low removals option projection shows growing-stock inventory increasing from 19.1 billion cubic feet in 1980 to 33.2 billion in 2010, a 74 percent rise. Growth is projected to peak about 1994 but remain higher than removals throughout the period.
- The high removals option projection shows inventory increasing from 19.1 billion cubic feet in 1980 to 29.9 billion in 2010. Growth will equal removals by 2010, at which time inventory should stablize.

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MICHIGAN'S FOURTH FOREST INVENTORY: IMBER VOLUMES AND PROJECTIONS OF TIMBER SUPPLY

John S. Spencer, Jr., *Principal Resource Analyst, and* **Jerold T. Hahn**, *Principal Mensurationist*

TIMBER VOLUME INCREASED 27 PERCENT SINCE LAST INVENTORY

Michigan's volume of growing stock on commercial est land increased from 15.1 to 19.1 billion cubic t between 1966 and 1980, a 27-percent increase. is volume increase coincided with a shrinking nmercial forest land base. The area of commercial est land declined from 18.9[1] to 17.5 million acres ring the period between surveys, a 7.3-percent crease. As is true throughout the Lake States, chigan's rising timber volumes result from the ests' protracted recovery from the cutover and rned-over situation prevalent in the early 1900's. nd occupied by stumps and ashes eventually re-cked to trees that successively grew to sapling, etimber, then sawtimber size.

The volume of softwoods increased 34 percent ween surveys compared with an increase of 24 rcent for hardwoods as shown below:

cies	Growing-stock volume	
	1966	1980
	(Million cubic feet)	
twoods	4,001	5,356
dwoods	11,049	13,748
All species	15,050	19,104

The largest volume of growing stock is in the rthern Lower Peninsula Survey Unit (fig. 1)—6.8 lion cubic feet. This Survey Unit also had the atest increase in volume between 1966 and 1980— percent (table 1).

[1] *Published 1966 area and volume statistics have been usted to conform to 1980 statistics because of changes procedures and definitions. (See Making 1966 and 0 Data compatible.)*

The four counties in the State with the largest growing-stock volumes are all in the Western Upper Peninsula—Marquette (1,264 million cubic feet), Ontonagon (857 million), Iron (786 million), and Gogebic (764 million) (fig. 2).

In addition to the 19.1 billion cubic feet of growing stock on commercial forest land in the State, there are 2.1 billion cubic feet of rough and rotten trees, short-log trees, and salvable dead trees (table 2).

MAPLES MAKE UP ONE-FOURTH OF VOLUME

Sugar maple, with 2.7 billion cubic feet, is the leading species in terms of growing-stock volume, followed closely by red maple with 2.1 billion cubic feet. If the 0.2 billion cubic feet of black and silver maple are also included, the 5.0 billion cubic feet of maple volume represents 26 percent of Michigan's total volume of growing stock. The volume of hard maples (sugar and black) increased 21 percent between 1966 and 1980, but the soft maples (red and silver) vaulted ahead by 78 percent. Soft maple volume increased faster than other major species except black walnut, black cherry, yellow-poplar, and red pine, paralleling the situation found in most of the Northeast. Red maple is fast-growing and shade tolerant and was present in the understory of many stands where conditions were right for it to grow to poletimber or sawtimber size. A challenge is to find appropriate uses and markets for this expanding red maple resource.

The volume of quaking aspen, third greatest among species in the State with 1.7 billion cubic feet, amounted to 9 percent of Michigan's growing-stock. Quaking aspen, whose volume increased 18 percent between inventories, has been used for many years in the pulp and paper industry at a reasonably constant rate. With increasing use of aspen by the sawmill

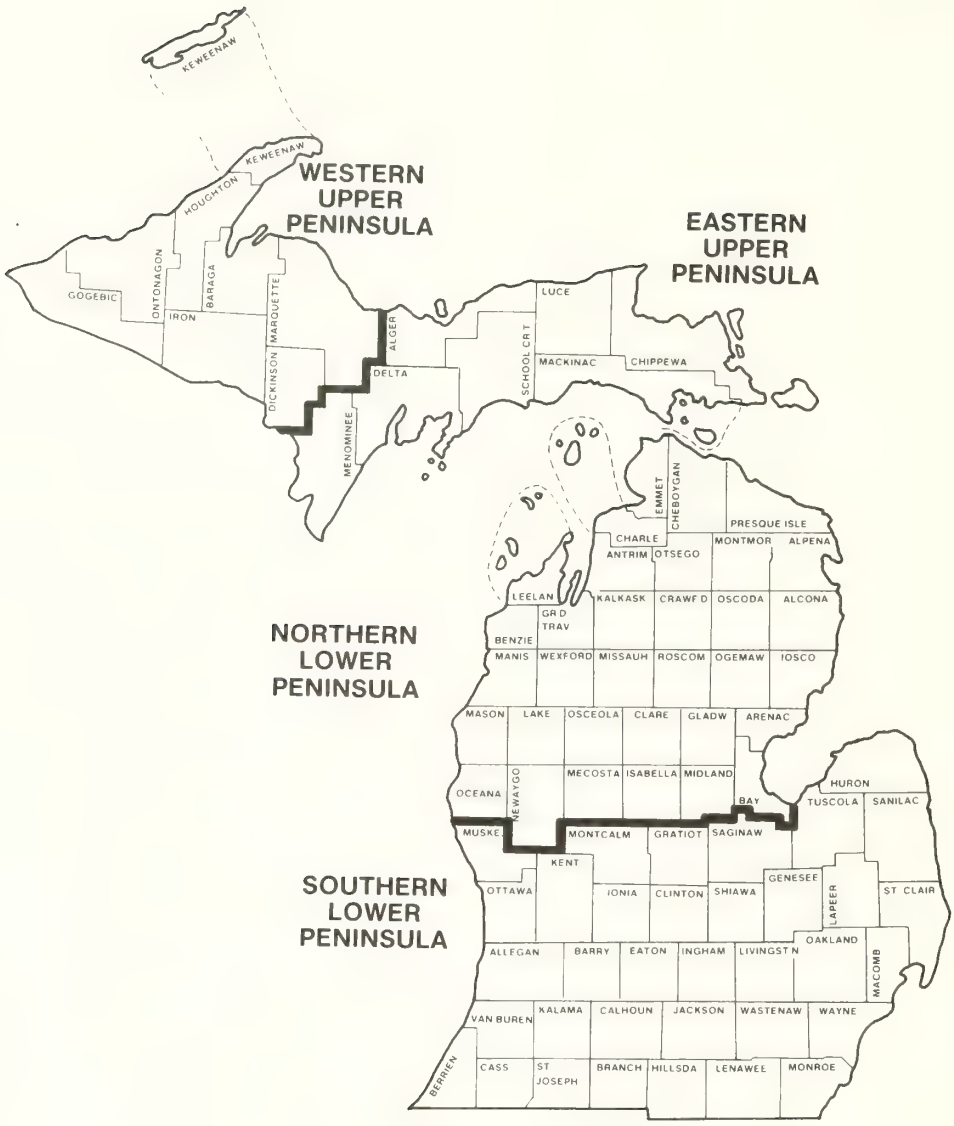

Figure 1.—*Michigan Survey Units, 1980.*

Table 1.—*Net volume of growing stock in 1966 and 1980 by Forest Survey Unit and change since 1966, Michig*

Forest survey unit	1966 growing-stock volume	1980 growing-stock volume	Change s 1966
	Million cubic feet		*Perce*
Eastern Upper Peninsula	3,403	4,035	+19
Western Upper Peninsula	4,757	5,785	+22
Northern Lower Peninsula	4,945	6,825	+38
Southern Lower Peninsula	1,945	2,459	+26
Total	15,050	19,104	+27

Figure 2.—*Growing-stock volume in Michigan counties by volume class, 1980.*

ble 2.—*Net volume of timber on commercial forest land by class of timber and softwoods and hardwoods, Michigan, 1980*

(In million cubic feet)

ss of timber	All species	Softwoods	Hardwoods
wing stock			
Sawtimber	8,930	2,709	6,221
Poletimber	10,174	2,647	7,527
Total growing stock	19,104	5,356	13,748
igh and rotten cull	1,212	219	993
ort-log cull	286	58	228
vable dead	628	224	404
All classes	21,230	5,857	15,373

industry and with the oriented strand board plant at Grayling utilizing aspen, demand for this species will rise.

Northern white-cedar (1.3 billion cubic feet), northern red oak (1.2 billion), bigtooth aspen (0.9 billion), paper birch (0.8 billion), and balsam fir (0.8 billion) collectively account for 26 percent of the State's growing-stock volume. The volumes of all these species increased between inventories.

Volume of elm declined the most since 1966, from 692 to 278 million cubic feet. This 60-percent drop is primarily the result of Dutch elm disease. Other species decreasing in volume are other red oaks (30 percent), beech (17 percent), yellow birch (9 percent), hemlock (6 percent), and cottonwood (4 percent).

NEARLY THREE-FOURTHS OF VOLUME IN TREES 12 INCHES IN DIAMETER AND SMALLER

Seventy-two percent of the growing-stock volume in Michigan is contained in trees 12 inches or smaller in diameter (fig. 3). More of the softwood volume (77 percent) is in these small-diameter trees than the hardwood volume (70 percent). The large number of poletimber-size softwoods in plantations, together

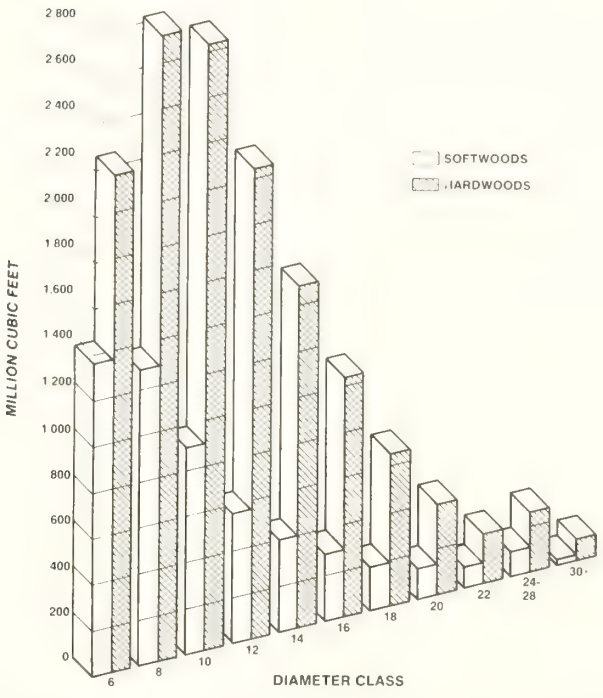

Figure 3.—*Net volume of growing stock on commerical forest land by softwoods and hardwoods and diameter class, Michigan, 1980.*

with the large softwood volumes in typically sm trees, such as jack pine, black spruce, and balsam account for this. Only 30 percent of the white p volume and 38 percent of the hemlock volume ar trees 12 inches in diameter or smaller, however.

Thirty-six percent of the total softwood volume .9 billion cubic feet) is dispersed throughout hardw forest types. One billion cubic feet of softwoods ar the maple-birch forest type alone. By contrast, on percent of hardwood volume (0.7 billion cubic fee scattered in softwood forest types.

In some cases, the volume of a species is greater forest type other than its own primary type. example, white spruce volume is greater in balsam fir type (111 million cubic feet), the ma birch type (85 million), and the aspen type (66 mill than in the white spruce type (49 million) (Appen table 16). This is true because a species may b component of a number of forest types, and a t with a small proportion of that species but wit large area may have more volume for the species t a type with a high proportion of the species but wit small area.

NONINDUSTRIAL PRIVATE PARTIE OWN 53 PERCENT OF VOLUME

Farmers own 3.3 billion cubic feet of growing-st volume, 17 percent of the total; other private, n industrial corporations and individuals own 6.8 bill cubic feet, 36 percent of the total (fig. 4). Togeth then, these owners control more than half of State's timber volume. If forest industry's 2.4 bill cubic feet are included, the total private volum 12.5 billion cubic feet, or two-thirds of Michiga total.

Public agencies account for 6.6 billion cubic fee the growing-stock volume. The State of Michig owns 3.6 billion cubic feet and the three Natio Forests contain 2.8 billion. County and munici agencies, Indian land, and miscellaneous fede agencies combined make up the remaining 0.2 bill cubic feet.

Private nonindustrial parties own a greater sh of the hardwood volume than of the softwood. Th own 53 percent of the total growing-stock volume they have 58 percent of the total hardwood volu and only 38 percent of the total softwood volume. the other hand, State land accounts for 19 percen the total growing-stock volume—25 percent of softwood volume and 16 percent of the hardw volume. And the National Forests, which grow percent of the State's timber volume, grow 21 perc

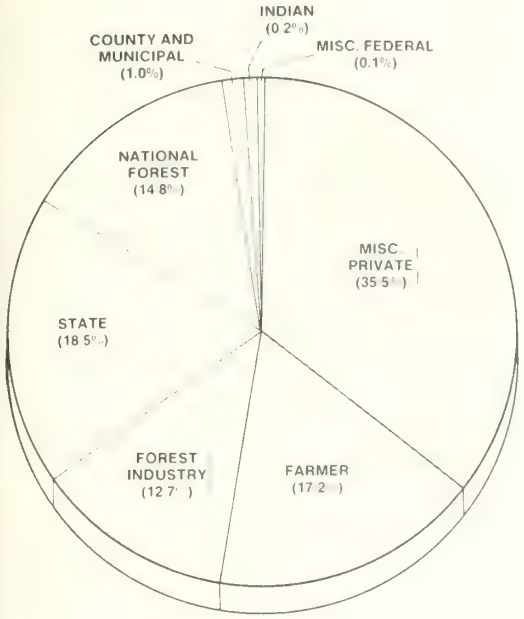

Figure 4.—*Percent of net volume of growing stock on commercial forest land by owner class, Michigan, 1980.*

the softwood volume and 12 percent of the hardwood volume.

Average volume per acre on commercial forest land 1,092 cubic feet, compared to 798 cubic feet in 1966. orest-industry-owned land averages 1,226 cubic feet er acre, National Forests 1,156, nonindustrial priate parties 1,089, and State 992. Average volume per ere was highest in the white pine type (1,403 cubic et), followed by the maple-birch type (1,321), orthern white-cedar type (1,193), paper birch type ,183), white spruce type (1,153), and the oak-hickory pe (1,136).

ARGEST VOLUME IN STANDS 41- TO 60-YEARS-OLD

The volume of growing stock by 10-year age classes roughly equal for stands 31- to 90-years-old, except r a surge of volume in stands aged 41-60 years (fig. . The enlarged volume in the latter age classes (31 ercent of total growing-stock volume) corresponds to e unusually large area of stands from 41- to 60ears-old (27 percent of Michigan's commercial forest ea). These stands originated between 1920 and 1939 hen fire control and tree planting programs were rst begun. A somewhat higher proportion of the olume in species associated with hardwood forest pes is in stands more than 90 years of age (23 ercent) than those in softwood types (20 percent). The ng-lived hardwood species in the maple-birch and k-hickory types contribute to this difference.

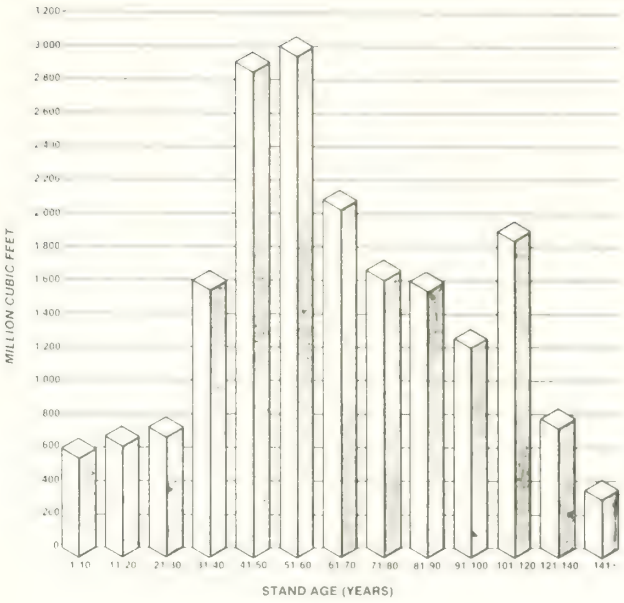

Figure 5.—*Net volume of growing stock on commercial forest land by stand-age class, Michigan, 1980.*

Volume in the maple-birch forest type, which predominates in Michigan with 42 percent of the growing-stock volume on 35 percent of the commercial forest area, increases in the 41- to 60-year stand-age classes. However, the volume in stands aged 61 to 120 years is reasonably evenly distributed. The type is generally long-lived, existing 120 years or more. Depending on stand conditions, either the selection, shelterwood, or clearcutting silvicultural systems can be used to regenerate maple-birch stands, although clearcutting is generally undesirable if timber is the management objective (Tubbs 1977). Individual tree selection has probably been used most in the past, which is reflected by the similarity of volumes in stands older than 60 years.

A somewhat different situation is illustrated by the distribution of volume by stand age in the shorter-lived aspen forest type, which accounts for 16 percent of the total growing-stock volume. The same bulge occurs in the 41-60 year stand-age classes; and of the 3.1 billion cubic feet in the type, 1.0 billion are in stands older than 60 years. The recommended rotation age for aspen in the Lake States depends on the site index of the stand and the desired end product. Usually, aspen on low sites (site index 50 and less) managed for fiber production is harvested at about age 35, and aspen on high sites (site index 70+) managed for sawtimber is harvested at about age 60 (Perala 1977). Generally, aspen on poor sites deteriorates earlier than high site aspen, making it prudent to harvest poor sites earlier to reduce natural loss. In Michigan, where two-thirds of the aspen volume is in

the aspen forest type, the large volume of the type beyond 60 years of age suggests that many of these stands have already experienced some degree of loss.

SAWTIMBER QUALITY IS LOW

Sixty-nine percent of Michigan's sawtimber volume is in grade 3[2] saw logs. The relatively small average tree size contributes to the preponderance of volume in this grade (as mentioned earlier, 72 percent of the total growing-stock volume is in trees 12 inches d.b.h. and smaller). Hardwoods contain a much higher percentage of volume in the higher grades (1 and 2) (30 percent) than do softwoods (7 percent) (fig. 6). Because different log grade standards and computing techniques were used in 1966 and 1980, it is not possible to compare sawtimber quality between the two surveys.

Yellow-poplar produces the highest percentage of sawtimber volume in log grades 1 and 2 (54 percent), followed by elm (47 percent), basswood (47 percent), yellow birch (41 percent), ash (39 percent), and hard maple (39 percent).

NET GROWTH RISES

The volume of net annual growth on commercial forest land increased from 505 million cubic feet in 1965 to 678 million in 1979—a 34 percent gain. Softwood growth increased faster between surveys (46 percent) than hardwood growth (30 percent).

The growth rate in 1979 is 3.5 percent of inventory, compared to a rate of 3.4 percent in 1965. The softwood growth rate in 1979 is somewhat higher (3.8 percent) than the hardwood rate (3.4 percent). Average net annual growth per acre was 45 percent higher in 1979 than it was in 1965 (fig. 7). This is a substantial gain between inventories, suggesting continued rebuilding of the State's forests.

Twenty-eight percent of the total net growth in 1979 is ingrowth—the net volume of saplings that grew to poletimber size during the year. The remainder is growth on trees already 5-inches d.b.h. and larger. The area of sapling and seedling stands has steadily declined since the mid 1950's—from 6.8 million acres in 1955 to 5.4 million acres in 1966, and, finally, to 4.4 million acres in 1980. If the decline continues, the proportion of growth attributed to ingrowth will likewise decline. This could result in

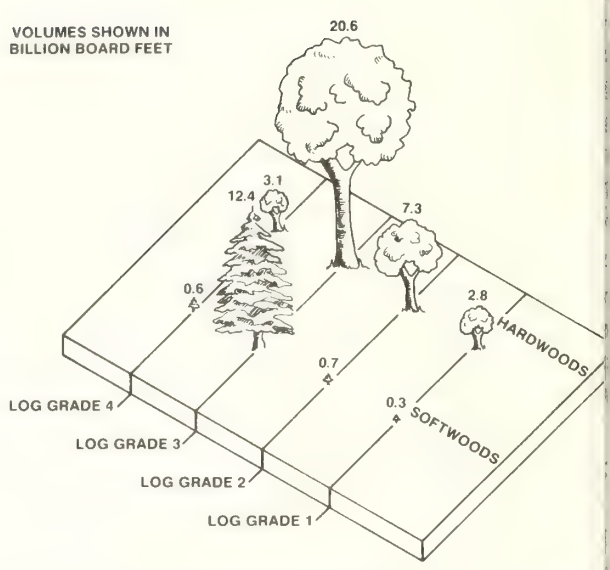

Figure 6.—*Net volume of sawtimber on commercial forest land by log grade and softwoods and hardwoods, Michigan, 1980.*

reduced net growth volumes in the future unless the level of management intensifies to the point where the added growth on trees 5-inches d.b.h. and larger offsets the shrinking ingrowth volume. The 30-year projections of inventory, growth, and removals discussed later in this report assume a level of forest management unchanged from recent trends. Both the low and the high removals option projections indicate a peak in volume of net annual growth around 1991, followed by a decline.

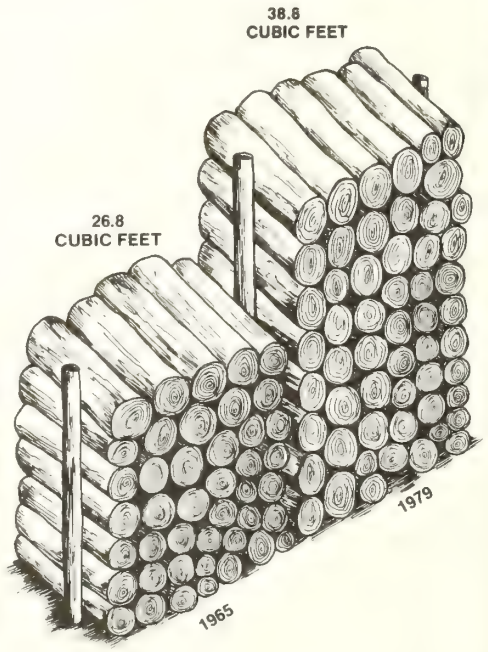

Figure 7.—*Average net annual growth per acre of growing stock on commercial forest land, Michigan, 1965 and 1979.*

[2]*Third best of the four log grades used to estimate sawtimber quality in Michigan, as described further in the Appendix.*

Although the Lower Peninsula supports 49 percent the State's growing-stock inventory, it accounts for ? percent of the net growth volume. Growth rates are ghest in the Northern Lower Peninsula (3.9 per-nt), followed by the Southern Lower Peninsula (3.6 ercent), the Western Upper Peninsula (3.4 percent), id the Eastern Upper Peninsula (3.3 percent).

Growth rates for individual species ranged from 6.3 ercent for red pine and 5.8 percent for white spruce id ash to a negative 4.4 percent for elm. Elm lost round because mortality from Dutch elm disease ceeded growth.

POTENTIAL GROWTH ESTIMATED

We cannot accurately measure the potential net owth (or productive potential) of the State's com-ercial forest at present. However, we made a crude timate using site class information. Site class values dicate the annual volume of growth per acre of fully ocked natural stands at culmination of mean annual crement. By multiplying the area in each site class the midpoint of the growth range in that class, we timated the potential growth in the State (table 3). his method yields inflated results because most ands in Michigan are not fully stocked and are not atural (unmanaged or uncut). Also, it does not take to account the present distribution of age classes or e obvious differences in growth among them. Spurr id Vaux (1976) discounted an estimate of potential owth for the Nation by 10 percent to arrive at what ey considered a realistic figure. A recent study of e aspen type in Wisconsin suggests that potential owth is 52 percent higher than current growth undgren and Hahn 1978).

Using the above method, the potential net annual owth for Michigan is 1.1 billion cubic feet or 64 cubic feet per acre. Discounting this potential growth by 10 percent results in 1.0 billion cubic feet or 57 cubic feet per acre, which is a better estimate but one of unknown reliability.

Potential growth could be pushed even higher by widespread intensive forest management including thinning, planting genetically superior trees, and fertilizing.

DISEASE CAUSES LARGEST MORTALITY VOLUME

Mortality of growing-stock trees in 1979 amounted to 158 million cubic feet, 0.8 percent of inventory. The mortality rate for softwoods and hardwoods is virtually unchanged—0.8 percent and 0.9 percent, respectively. Highest rates are for elm (9.5 percent), tamarack (4.2 percent), balsam fir (3.1 percent), balsam poplar (2.1 percent), quaking aspen (1.9 percent), and bigtooth aspen (1.3 percent).

Disease destroyed more growing-stock volume than any other identifiable agent—62 million cubic feet or 39 percent of the total mortality volume. Diseases of elm, principally Dutch elm disease, accounted for 21 million cubic feet; and diseases of aspens, chiefly hypoxylon canker, accounted for 21 million cubic feet. Weather (19 million cubic feet) and insects (5 million cubic feet) follow disease as a cause of mortality. Volume losses from the spruce budworm, responsible for most of the insect-caused mortality shown in this report for 1979, are much less than those just several years later. Although defoliation and some mortality from the current spruce budworm outbreak had occurred while fieldwork for this survey was underway, most of it took place after 1980 when fieldwork was finished in the Upper Peninsula, where most of the State's balsam fir grows.

ible 3.—*Estimation of potential net annual growth on commercial forest land, Michigan, 1979*

Site class ft/acre/year)	Area of commercial forest land	Potential[1] net growth per acre	Total potential net growth
	Thousand acres	*Cu ft/acre/yr*	*Thousand cu ft/yr*
224-165	4.9	194.5	953.1
164-120	461.3	142.0	65,504.6
119-85	3,493.6	102.0	356,347.2
84-50	6,879.2	67.0	460,906.4
49-20	6,650.5	34.5	229,442.3
Total	17,489.5		1,113,153.6

[1] Midpoint of site class interval.

The proportion of mortality caused by insects and diseases differed substantially for softwoods and hardwoods (fig. 8).

Annual mortality of sawtimber in 1979 was 340 million board feet, 0.7 percent of inventory.

TIMBER REMOVALS GAIN

Timber removals from growing stock in 1979 were 15 percent higher than in 1965. Softwood removals declined 4 percent, but hardwood removals increased 21 percent between surveys:

Species	Timber removals from growing stock	
	1965	1979
	(Million cubic feet)	
Softwoods	59.0	56.4
Hardwoods	180.6	218.2
All species	239.6	274.6

Total sawtimber removals were practically unchanged between inventories. However, softwood removals dipped 14 percent, and hardwood removals gained 4 percent from 1965 to 1979:

Species	Timber removals from sawtimber	
	1965	1979
	(Million board feet)	
Softwoods	192.1	165.2
Hardwoods	723.7	750.3
All species	915.8	915.5

The aspens accounted for the largest share of growing-stock removals in 1979 with 83.2 million cubic feet. This amounts to 30 percent of total removals, even though the aspens comprise only 14 percent of total inventory. Aspen removals in 1965 were 72.9 million cubic feet. Removals of hard maple were second largest in 1979 with 32.3 million cubic feet, 18 percent higher than in 1965. Soft maple removals spurted from 12.6 to 24.0 million cubic feet between inventories. This amounts to a 91 percent gain, largest of any species. Select red oak (20.6 million cubic feet), jack pine (16.2 million cubic feet), and select white oaks (9.0 million cubic feet) also had large removals volumes.

Eighty-one percent of the removals volume (223.0 million cubic feet) was harvested for roundwood products, such as pulpwood, saw logs, and fuelwood. Other removals, trees removed but not used for products or trees left standing but "removed" from the commercial forest classification by land use change, amounted to 13 percent of the volume of removals (34.8 million cubic feet). Logging residue, unused trees killed by logging or the unused portion of cut

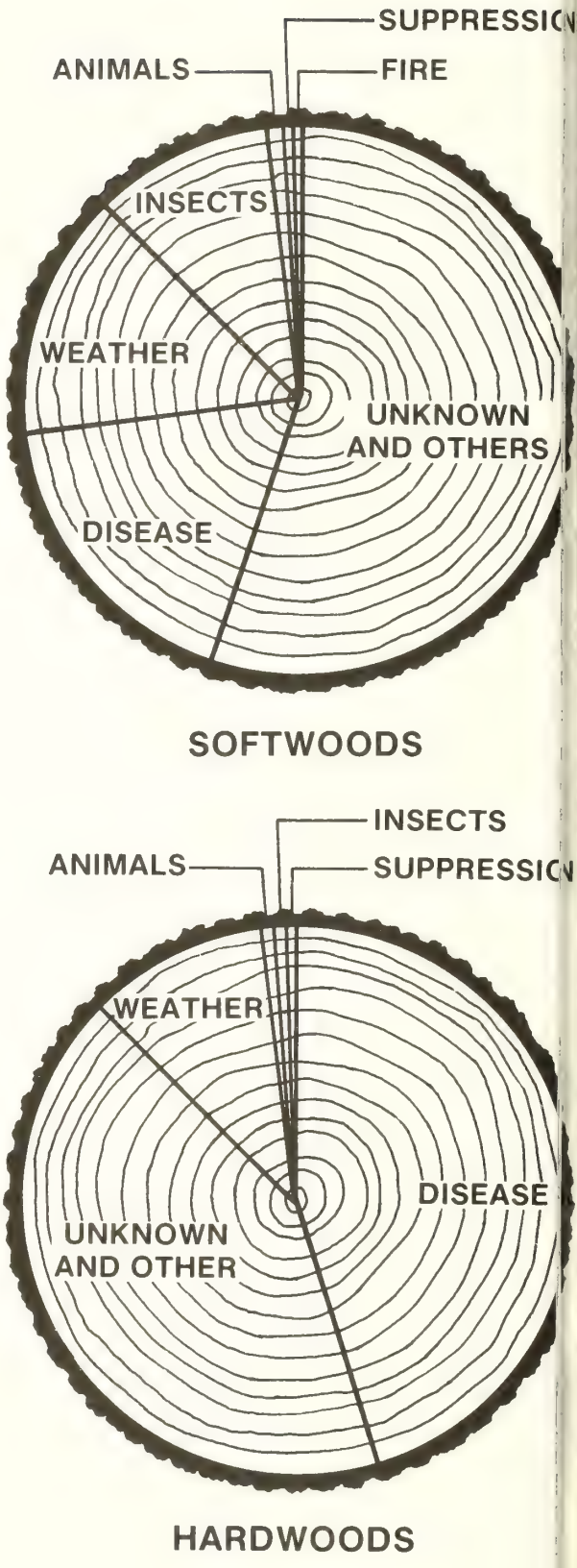

Figure 8.—*Annual mortality of growing stock on commercial forest land by cause of death and softwoods and hardwoods, Michigan, 1979.*

rees, accounted for the remaining 6 percent of re-
novals (16.8 million cubic feet).

Pulpwood (104.7 million cubic feet) and saw logs
93.8 million cubic feet) are the roundwood products
rom growing stock most in demand. Removals for
uelwood amounted to 8.3 million cubic feet in 1979,
p 68 percent from the 5.0 million cubic feet in 1965.
Removals for fuelwood are expected to climb as long
s home-heating costs remain high.

The bulk of removals from sawtimber-size trees for
oundwood products was, of course, saw logs, with 513
nillion board feet or two-thirds of the total.

The Northern Lower Peninsula Unit produced 38
ercent of the growing-stock removals, although it
ontains 36 percent of the growing-stock inventory.
The Western Upper Peninsula Unit accounted for 28
ercent of removals (30 percent of inventory), the
Eastern Upper Peninsula Unit contributed 20 per-
ent of removals (21 percent of inventory), and the
Southern Lower Peninsula Unit made up 14 percent
f removals (13 percent of inventory).

Private land supplied 77 percent of the removals
rom growing stock but contained only 65 percent of
he inventory. The 212 million cubic feet of removals
rom private land converts to a removals rate of 1.7
ercent, compared to a rate from public land of 0.9
ercent.

REMOVALS ARE 40 PERCENT OF GROWTH

A common way to evaluate the level of removals is
y comparing removals with growth. In Michigan,
he 275 million cubic feet of removals in 1979 were far less than the 678 million cubic feet of net growth. However, in States like Michigan where many stands are young and much of the growth volume is contributed by trees too small to be an important part of the removals volume, this kind of comparison is simplistic and potentially misleading. Another method that better represents the likely future scenario is to compare estimates of future removals with the predicted yields resulting from potential forest management activities. Estimates of such predicted yields for Michigan from 1980 to 2010 were published by Smith and Jakes (1983). The Stand and Tree Evaluation and Modeling System (STEMS), a set of computer programs for projecting the growth of forest stands, was used to project Michigan's commercial timber supply for the next three decades (Belcher *et al.* 1982). STEMS was programmed to select four treatment opportunities: harvest, thinning, timber stand improvement, and stand conversion or restocking. The management criteria for selecting treatments were developed in conjunction with foresters from the Michigan Department of Natural Resources. STEMS then produced tables showing the areas qualifying for each treatment and the volumes to be removed during those treatment operations. These volumes were compared to estimates of future removals in order to judge if timber shortages may be a possibility in the years ahead. Two estimates of removals were made—a high level and a low level.

These comparisons suggest that yields resulting from all STEMS treatments (supply) should exceed the high and low estimates of removals (demand) for both softwoods and hardwoods throughout the 30-year projection period (table 4). This implies a level of management much intensified from the current level. However, yields from STEMS harvest treatment

Table 4.—*Comparison of estimated average annual yield from treatment of commercial forest land to estimated average annual removals (high and low levels) from growing stock, for softwoods and hardwoods, Michigan, 1981 to 2010*

(In million cubic feet)

Species group and decade	Estimated average annual yield		Estimated average annual removals from growing stock	
	From STEMS harvest treatment	From all STEMS treatments	High level	Low level
Softwoods				
1981-1990	140.7	164.9	69.7	54.9
1991-2000	170.5	199.8	115.9	71.2
2001-2010	202.0	236.1	171.1	97.9
Hardwoods				
1981-1990	297.1	405.6	244.3	214.4
1991-2000	357.8	467.2	316.9	260.3
2001-2010	374.4	504.2	400.4	319.8

alone may not be adequate to meet the high estimate of demand for certain hardwood species by the middle of the third decade.

We compared 1979 removals from growing stock with STEMS estimated yields from treatments during the decade 1981-1990 by individual species. This comparison suggests that removals for some species already exceed the average for the decade ahead and that the opportunity exists to increase removals for other species. Removals in 1979 in some survey units for jack pine and aspen were greater than average annual yields during 1981-1990, but removals of paper birch are much lower than STEMS yields and, perhaps, could be doubled.

The STEMS yields are based on the following assumptions: (1) all commercial forest land is available for treatment, (2) markets exist for all species and products, and (3) no economic, social, or political constraints are placed on performing the treatments. Because these assumptions represent ideal rather than existing conditions, the yields generated by STEMS should be discounted accordingly (table 4).

FOREST BIOMASS ESTIMATED

Interest in the total volume of trees (including limbs, leaves, and bark) and shrubs is gaining as wood receives increasing attention as a source of energy, as technological change permits wood fiber to be used in innovative ways, and as timber harvesting costs continue to rise. In recognition of this interest an estimate of the aboveground green weight of live trees and shrubs in Michigan was made as part of the inventory.

The total biomass of all live trees at least one inch in d.b.h. on commercial forest land is 1.0 billion green tons (an average of 60 tons per acre) in 1980. The largest weight of biomass is in the maple-birch forest type with 450 million tons (74 tons per acre), the aspen type with 166 million tons (49 tons per acre), the oak-hickory type with 116 million tons (65 tons per acre), and the northern white-cedar type with 74 million tons (63 tons per acre).

Fifty-one percent of the total live tree biomass is in the boles of growing-stock trees and 24 percent of the total is in the tops and limbs of growing-stock trees as shown in the following tabulation:

Biomass component	Weight (Million green tons)
Growing-stock trees	
Boles	530.9
Tops and limbs	247.6
Cull trees	
Boles	44.7
Tops and limbs	29.6
1- to 5-inch trees	193.7
Total	1,046.5

Shrub biomass is greatest in the tamarack forest type where it averages 4,533 pounds per acre, followed by the black spruce type (3,250 pounds per acre), the balsam fir type (2,730 pounds per acre), and the elm-ash-soft maple type (2,244 pounds per acre).

Among the tall shrubs, which include live trees less than 1-inch in d.b.h., the species with the greatest average biomass is sugar maple with 209 pounds per acre[3]. Speckled alder was next with 197 pounds per acre, followed by balsam fir with 103 pounds per acre and red maple with 96 pounds per acre.

Bilberry-blueberry, among the low shrub species, had the greatest average biomass, 53 pounds per acre. Raspberry-blackberry followed with 28 pounds per acre, then leatherleaf (18 pounds per acre), and labrador tea (11 pounds per acre). Many shrub species, both tall and low, are important as wildlife food and cover.

PROJECTIONS OF NATIONAL TIMBER SUPPLY

The most recent projection of national demand for roundwood shows consumption increasing from 13 billion cubic feet in 1976 to 25.2 billion in 2010, a 89-percent jump (USDA Forest Service 1980). Softwood demand is projected to grow from 10.3 to 17 billion cubic feet during the same period—a 7[illegible] percent gain—but hardwood demand is projected to jump from 3.0 to 7.5 billion cubic feet—a 150-percent increase. The faster rate of growth for hardwood reflects a projected rise in demand for hardwood pulp products, hardwood lumber for pallets and railroad ties, and hardwood plywood and veneer for furniture. This projection, made at a medium level of population and economic growth, assumes that the price trend

[3] *A weighted average based on the number of plots sampled in each forest type and the biomass of each species in the type, including types in which the shrub species was not found.*

ı the base period used in making the projection roughly from the late 1950's through the mid 1970's) ontinue through the projection period.[4] When the xcess of roundwood imports (4.5 billion cubic feet) ver exports (1.5 billion) is subtracted from the rojected demand in 2010, the result is the demand on Jnited States forests—22.2 billion cubic feet.

National supplies (timber available for harvest) of oundwood are projected to increase from 12.1 to 18.7 illion cubic feet between 1976 and 2010.[5] Projected emand on United States forests in 2010 exceeds upply by 3.5 billion cubic feet. The short-fall for oftwoods (3.3 billion) is much larger than that for ardwoods (0.2 billion).

MICHIGAN'S TIMBER PROJECTIONS

Michigan's timber resource will play a significant ole in the Nation's demand-supply outlook. A look at hat is likely to happen to the State's future timber esource under several levels of removals can help put Iichigan in perspective with the Nation.

Two 30-year projections of the State's timber situaion were made using the Timber Resource Analysis ystem (TRAS) program (USDA Forest Service 970). One projection assumes a continuation of recent evels of timber removals (low removals option), and he other assumes a higher level of removals (high emovals option). Separate projections were made for oftwoods and hardwoods. TRAS uses a stand-projecion technique involving input of number of trees, rowth rates, mortality rates, and removal rates, all y 2-inch diameter classes, along with assumed total emovals by year and assumed ingrowth into the 2-ıch diameter class.

Assumptions common to both options are: (1) the otal area of commercial forest land will decline from 7.5 million acres in 1980 to 17.2 million acres in 2010; 2) radial growth will decline in relation to the inrease of basal area per acre of trees; (3) the intensity f forest management will continue at the rate indiated by recent trends; and (4) the volume of "other" emovals will drop during the period as more of these rees are utilized for products.

[4] *Another projection was made assuming that prices vill rise enough to maintain an equilibrium between rojected demand and supply.*

[5] *Projection shows the volume of timber available for arvest from domestic forests if recent trends in the rces determining supply, such as commercial timberınd area, management, and prices, continue through he projection period.*

LOW REMOVALS OPTION PROJECTION

The low option assumes that softwood timber removals will decline to about 54 million cubic feet in 1985 and then increase to 110 million cubic feet per year by 2010. It assumes that hardwood removals will decline to 210 million cubic feet in 1985; and then increase to 347 million cubic feet per year by 2010 (table 5). Growth is projected to exceed removals, to peak about 1993, and then to turn down. Therefore, inventory is projected to increase at an average annual rate of 2.45 percent or 469 million cubic feet (fig. 9).

This projection shows removals increasing from 275 million cubic feet in 1979 to 456 million in 2010, a 66 percent gain. Removals for the major roundwood products—pulpwood, saw logs, and fuelwood—are all assumed to rise during the projection period but more of these products are assumed to be recovered from "other" removals.

Growth is projected to increase from 678 million cubic feet in 1979 to 852 million in 1990, then to decline to 674 million in 2010. At the beginning of the projection period, the surplus of growth over removals is 403 million cubic feet. By 1990 the surplus is projected to grow to 568 million cubic feet, but by 2010 it is projected to shrink to 218 million.

The 1980 inventory of 19.1 billion cubic feet is projected to rise to 33.2 billion in 2010, a 74 percent gain. The rise of the inventory curve remains fairly constant over the entire projection period.

HIGH REMOVALS OPTION PROJECTION

Timber removals under this option are assumed to increase at different rates for each 5-year period but

Table 5.—*Assumed average annual change of timber removals used in projections of timber resource in Michigan, 1980-2010*

Period	Low removals option		High removals option	
	Soft-woods	Hard-woods	Soft-woods	Hard-woods
	Percent annual change			
1980-1984	-1.2	-1.0	2.5	1.3
1985-1989	1.0	1.2	4.6	2.6
1990-1994	3.6	2.7	6.2	2.9
1995-1999	4.0	2.3	4.8	2.5
2000-2004	3.1	2.0	3.6	2.3
2005-2010	2.5	1.8	3.2	2.2

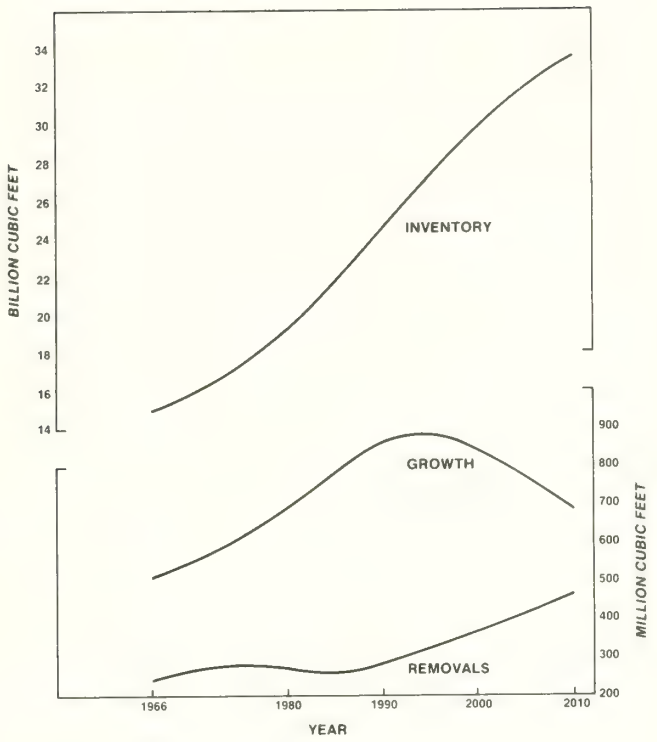

Figure 9.—*Removals, net growth, and inventory of growing stock in Michigan, 1966 and 1980, and low removals option projection for 1981-2010.*

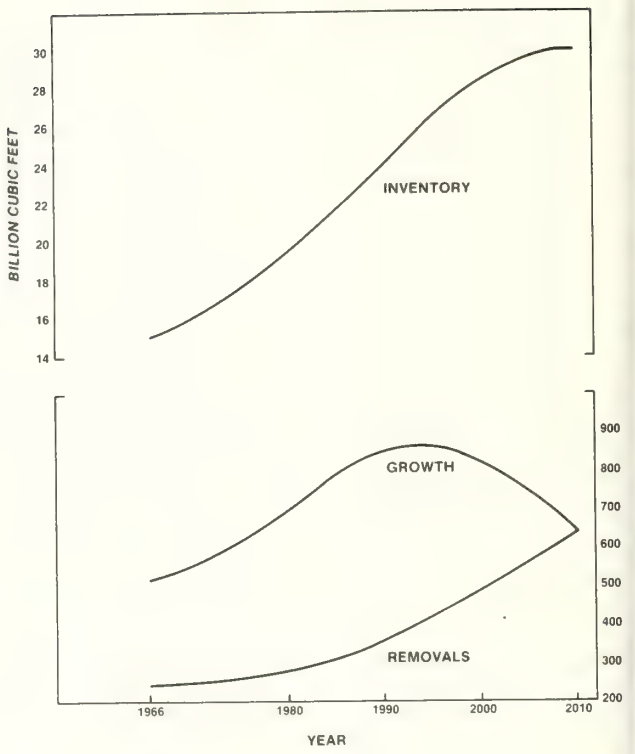

Figure 10.—*Removals, net growth, and inventory of growing stock in Michigan, 1966 and 1980, and hig removals option projection for 1981-2010.*

to increase at an average annual rate of 4.4 percent (table 5). Removals will converge with growth about 2010. Inventory is projected to increase more slowly as growth approaches removals and then to go flat when the two are equal (fig. 10).

Under the high removals option, removals jump from 275 to 638 million cubic feet between 1979 and 2010, a 132 percent gain. Softwood removals are projected to increase from 56 to 197 million cubic feet. This option assumes larger markets for roundwood products than the low removals option does.

The 1979 growth of 678 million cubic feet is projected to rise to 857 million by 1994, then to sag to 639 million by 2010. The excess of growth over removals of 403 million cubic feet in 1979 is projected to enlarge to 494 million in 1988, then to do an about-face and end with removals approximately equal to growth at 638 million cubic feet by 2010.

Inventory rises quickly from 19.1 to 28.0 billion cubic feet between 1980 and 2000. Then, in response to the narrowing difference between removals and growth, the rate of increase slows so that by 2010 inventory is about 29.9 billion cubic feet.

THE OUTLOOK

The low and high removals options represent th forest situation only if the assumptions upon whic they are based are realized. The projections are n intended to convey what is desirable from silvicu tural, economic, or social viewpoints; they are simp indicators of what is likely to happen if forests a managed much as they have been for the last 15 yea and if harvesting occurs at a "high" or "low" leve Projections for the first decade are the most mea ingful because fast-changing market and econom conditions can quickly nullify the assumptions mad for the projections for the last two decades.

Inventory, then, is likely to continue accumulatin at a rate similar to that of recent trends. A mo intensive level of timber management than th assumed could lead to increased timber growth ar larger-than-projected inventories. Timbe stand treatment opportunities in the State from 19 to 2010 are discussed in "Michigan's Predicted Tin ber Yields 1981-2010" (Jakes and Smith 1983). Timbe supplies might also be extended through more con plete utilization of residues, tree tops, and limbs, th volumes of which are not included in growing-stoc inventories. Inventories would also be larger than pr

jected if the actual area of commercial forest land converted to other uses is less than assumed or if much of the land converted is of low site quality.

The maple-birch type occupied 6.1 million acres (35 percent) of Michigan's commercial forest land in 1980, an increase of almost 900,000 acres since 1966. This increase, which is expected to continue but at a slower rate, reflects the increasing maturity of the State's forests and a trend toward climax types. The increase in the maple-birch type contrasts with the loss of 744,000 acres in the aspen type, a trend that is also expected to continue, at least for the short run. As more aspen stands are intensively managed, the decline in aspen type may slow or reverse. These trends could suggest potential problems for industries using the aspen resource but may represent opportunities for expansion in those industries able to use maple, basswood, and associated species. It seems likely that the volume of red and white pines, species traditionally preferred for lumber in the State, will increase in the future. The areas of these forest types are expected to increase slighty due to the amount of past and continuing red pine plantings. However, large diameter softwood trees will be less plentiful. Future softwood yields will also increase as a result of the ongoing tree improvement efforts to provide genetically superior planting stock.

Nonindustrial private forest landowners control 53 percent of the commercial forest land and 53 percent of the growing-stock volume. Policies that seek to bring practical, technical information and assistance on forest management to these owners will help to achieve a more favorable future timber outlook for the State. And policies that make timber growing more profitable for these owners will have the same effect. Expanded markets for timber products and financial incentives, such as tax incentives for forest landowners and cost-share programs for tree planting and timber stand improvement, are some ways to make enlightened timber management more attractive to these owners.

However, more immediate gains from improved forest management are more likely to come from public and forest industry land. Owners of this land have greater access to technology and capital and a stronger commitment to use them to supply the market system.

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APPENDIX

ACCURACY OF SURVEY

Forest Inventory and Analysis information is based on a sampling procedure designed to provide reliable statistics at the State and Survey Unit level. Consequently, the reported figures are estimates only. A measure of reliability of these figures is given by sampling errors. These sampling errors mean the chances are two out of three that the true inventory value is within the limits indicated.

For example, the estimated growing-stock volume in Michigan in 1980, 19,103.8 million cubic feet, has a sampling error of ±0.70 percent (±133.7 million cubic feet). Therefore, the growing-stock volume from a 100-percent inventory would have a two in three chance of falling between 18,970.1 and 19,237.5 million cubic feet.

The following tabulation shows the sampling errors for the 1980 Michigan inventory:

Item	State totals	Sampling error
Growing stock	(Million cubic feet)	(Percent)
Volume	19,103.8	0.70
Growth	677.8	1.04
Removals	274.6	7.17
Sawtimber	(Million board feet)	
Volume	47,669.1	1.08
Growth	2,384.4	1.74
Removals	915.5	8.31
Commercial forest area	(Thousand acres) 17,489.5	0.33

As survey data are broken down into sections smaller than State or Survey Unit totals, the sampling error increases. For example, the sampling error for growing-stock volume in a particular Unit or county is higher than that for total growing-stock volume in the State (table 62 shows the sampling errors for estimates smaller than State totals).

SURVEY PROCEDURES

The major steps in the survey of Michigan were as follows:

1. A total of 176,976 1-acre points were systematically distributed across aerial photos of the entire State, except the National Forests. In order to make a preliminary estimate of forest area, these points were classified into land classes (table 6). Next, a total of 83,103 of these points were stereoclassified by forest type, stand-size class, and density. Finally, 13,991 points were examined on the ground to correct the preliminary area estimate for errors in classification and for actual changes in land use since the photos were taken.

At each forest ground plot location, variable-radius plots (basal area factor 37.5) were established at 10 points uniformly placed over the sample acre. Tree

Table 6.—*Number of photo points classified and stereo-classified, and number of ground plots visited, Michigan, 1980*

(In number)

Land class	Photo points classified	Photo points stereo-classified	Ground plots visited
Forest land	82,170	82,170	7,70
Unproductive forest land	114	114	1
Nonforest land			
with trees	3,029	182	18
without trees	86,327	0	5,62
water	4,699	0	37
Questionable	637	637	8
Total	176,976	83,103	13,99

measurements made at these locations and at 775 plots established in 1966 and remeasured in 1980 were the basis for estimates of timber volume, growth, mortality, number of trees, and other forest classifications on non-National Forest land. Estimates for National Forest land were based on 588 plots established between 1976 and 1980 on the Huron-Manistee, Hiawatha, and Ottawa National Forests.

2. Growth and mortality on all commercial forest land were estimated using the Stand and Tree Evaluation and Modeling System (STEMS)[6] after the System was adjusted with factors derived from the remeasurement of plots established in 1965. STEMS is an individual tree-growth projection system that uses the following stand and tree characteristics to simulate tree growth by updating tree diameter and tree status (live, dead, or cut): species, tree diameter, crown ratio, site index, stand basal area, and average stand diameter. These characteristics were used to produce growth and mortality rates that were adjusted based on remeasurement plot information and applied to the original tree list to yield an updated tree list. Net volume equations were applied to the original and updated tree lists to estimate volumes of growth and mortality.

3. Under an agreement with the National Forest Eastern Region, North Central Station crews established 10-point variable radius plots on the Hiawatha and Huron-Manistee National Forests in 1976 and the Ottawa National Forest in 1980. National Forest personnel provided the Station with the area of commercial forest land by forest type, stand-size class, and density for the Forest, and the North Central Station computed all volume data in the same manner as the non-National Forest data. Data from the Hiawatha and Huron-Manistee National Forests were updated with STEMS to provide current estimates of volume, growth, removals, and mortality. Area and volume tables were approved by the Forest staff before publication.

4. Statistics on timber utilization during 1978 were obtained from mill surveys. The Michigan Department of Natural Resources canvassed resident sawmills, veneer mills, and other primary wood-using plants. The North Central Forest Experiment Station canvassed out-of-State sawmills, pulpmills, and veneer mills to determine their use of Michigan timber. Fuelwood and fencepost output was based on a sample of public and private landowners to determine their production of fuelwood and fenceposts and on a canvass of industrial and public timber owners. Estimates of primary mill residue used for fuelwood were obtained from the canvass of Michigan primary wood-using plants. Timber cut for products by ownership class was determined by a canvass of public and industrial timber owners. The portion of timber cut unaccounted for by the latter owners was grouped under "farmer and other owners".

5. A total of 2,239 felled trees on 123 active logging operations were measured throughout the State during 1977-1978 to develop wood utilization factors for converting timber products output to timber removals for saw logs and pulpwood. Factors for all other products were obtained during the 1964-1965 Michigan utilization study.

MAKING 1966 AND 1980 DATA COMPATIBLE

Data from new forest inventories are often compared with data from earlier inventories to determine trends in forest resources. Changes in procedures and definitions between surveys make it necessary to adjust earlier survey data so that they are comparable to data from the new survey. A consistency check was made for each Forest Survey Unit in Michigan to ensure that the changes observed between inventories reflected actual changes in the resource and not changes in definitions or procedures.

Changes were made between the 1966 and 1980 Michigan inventories in (1) the definition of ownership classes, (2) the definition of productive-reserved forest land, (3) procedures for determining the area of nonforest land by land class, and (4) volume equations.

In 1966, State Forest was a separate owner class and included only land on State Forests. Other forested State-owned land was included under the Other Public ownership class. In 1980, the State owner class included all State land. However, State-owned commercial forest land outside the State Forest areas is small in Michigan and general comparisons may be made between the 1966 and 1980 State estimates.

Some mining companies were called diversified forest industry in 1966 and classed under the Forest Industry ownership class. In 1980 these companies were classed under Miscellaneous Private Corporation ownership class. Therefore, a comparison of statistics for Forest Industry owner between 1966 and 1980 is possible only if the Forest Industry and Miscellaneous Private Corporation ownerships in 1980 are combined.

[6] *For more information on STEMS, see: Belcher, D. M., et al. 1982.*

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During the 1966 forest inventory, Christmas tree plantations were classified as commercial forest land whereas they are now classified as productive-reserved forest land. Likewise, sharptail grouse management areas were classified as commercial forest land in 1966 but were classed as productive-reserved in 1980. The 1966 commercial forest and productive-reserved areas were adjusted so that they are comparable to 1980 estimates.

In the 1966 forest inventory, the 1964 Census of Agriculture estimates of cropland, pasture, and rangeland areas were used in our inventory report tables. The 1980 inventory estimates of cropland, pasture, and rangeland come from aerial photointerpretation done by Forest Inventory and Analysis personnel in St. Paul. The published 1966 estimates of these areas were adjusted to be compatible with 1980 estimates.

The procedures used to determine the number of growing-stock trees by species group and 2-inch diameter class have improved between the 1966 and 1980 forest inventories. The procedure used in 1966 overestimated the number of growing-stock trees, especially in the lower diameter classes. The 1966 estimates of number of trees were adjusted so that differences between 1966 and 1980 represent actual changes in the resource, not changes in procedures. Additional adjustments were made in the 1966 number of growing-stock trees to reflect the transfer of Christmas tree plantations to productive-reserved forest land.

The volume equations used in 1980 more accurately estimate tree volume than those used in 1966. Therefore, the 1966 volumes were adjusted by factors derived from the 1980 volume equations to make them comparable to 1980 volumes.

A test was made to ensure that it was possible to move from the adjusted 1966 resource statistics to the 1980 values. This was done using Timber Resource Analysis System (TRAS), a Forest Service computer program for updating, backdating, and projecting timber volume, growth, mortality, and removals. Using the adjusted 1966 numbers of softwood and hardwood trees by 2-inch diameter class and applying 1980 cubic feet per tree estimates, 1966 softwood and hardwood volumes were generated that are comparable with 1980 volumes. Then, using growth rates, mortality rates, and removals rates for the period between the two surveys, TRAS moved the inventory from 1966 to 1980. The program printed out volumes for softwoods and hardwoods by diameter class for each selected year in the period. Thus, inconsistencies in volume, growth, mortality, and removals were identified and resolved.

TRAS generated an estimate of what total removals had to be in order for the inventory to have changed as it did between surveys, given the volume, growth, and mortality data. Estimates of removals for products and for logging residues—two of the three components of total timber removals—were available from an independent utilization study. An estimate of "other" removals (see Definition of Terms in Appendix), the third component of total removals, was made by subtracting the first two removals components from the TRAS-generated total removals estimate. This estimate of "other" removals is compared with findings from remeasurement plots and new plots (stump counts and land use change) to check its validity. When necessary, TRAS was rerun and adjusted until other removals were compatible with the estimate from field data. Total removals were "trend level removals" because the estimate of "other" removals was based on a removals trend line from 1966 to 1980.

LOG GRADE

In Michigan the butt log of every sawtimber tree or every full permanent sample plot was graded for quality. Additionally, all of the logs in a smaller sample of trees throughout the State were graded. The volume yield by log grade for each tree in the latter sample was used to distribute the volume of trees in the former sample into log-grade classes. The resulting volumes by log-grade classes were expanded to provide an estimate for the entire State.

Logs were graded on the basis of external characteristics as indicators of quality. Hardwood species were graded according to Hardwood Log Grades for Standard Lumber".[7] The best 12-foot section of the lowest 16-foot hardwood log, or the best 12-foot upper section if the butt log did not meet minimum log grade standards, was graded as follows:

[7] *Vaughn, C. L.* et al. *1966.*

Forest Service standard grades for hardwood factory saw logs

Grading factors		Specifications							
		Log grade 1			Log grade 2				Log grade 3
Position in tree		Butts only	Butts and uppers		Butts and uppers				Butts and uppers
Scaling diameter, inches		[1]13-15	16-19	20+	[2]11+	12+			8+
Length without trim, feet			10+		10+	8-9	10-11	12+	8+
Required clear cuttings[3] of each of three best faces[4]	Min. length, feet	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	No Limit
	Min. proportion of log length required in clear cutting	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep and crook allowance	For logs with less than one-fourth of end in sound defects		15 percent			30 percent			50 percent
	For logs with more than one-fourth of end in sound defects		10 percent			20 percent			35 percent
Maximum scaling deduction			40 percent[5]			50 percent[6]			50 percent

[1]Ash and basswood butts can be 12 inches if they otherwise meet requirements for small #1's.
[2]Ten-inch logs of all species can be #2 if they otherwise meet requirements for small #1's.
[3]A clear cutting is a portion of a face, extending the width of the face, that is free of defects.
[4]A face is one-fourth of the surface of the log as divided lengthwise.
[5]Otherwise #1 logs with 41-60 percent deductions can be #2.
[6]Otherwise #2 logs with 51-60 percent deductions can be #3.

Forest Service standard specifications for hardwood construction logs (tie and timber logs)[1]

Position in tree		Butt and upper
Min. diameter, small end		8 inches +
Min. length, without trim		8 feet
Clear cuttings		No requirements.
Sweep allowance, absolute		One-fourth of the diameter at the small end for each 8 feet of length.
Sound surface defects	Single knots	Any number, if no one knot has an average diameter above the callus in excess of one-third of the log diameter at point of occurrence.
	Whorled knots	Any number if sum of knot diameters above the callus does not exceed one-third of the log diameter at point of occurrence.
	Holes	Any number provided none has a diameter over one-third of the log diameter at point of occurrence, and none extends more than 3 inches into included timber.[2]
Unsound surface defects		Same requirements as for sound defects if they extend into included timber.[2] No limit if they do not.
End defects	Sound	No requirements.
	Unsound	None allowed; log must be sound internally, but will admit one shake not to exceed one-fourth the scaling diameter and will admit a longitudinal split not extending more than 5 inches into the contained timber.

[1]These specifications are minimum for the class. If, from a group of logs, factory logs are selected first, thus leaving only nonfactory logs from which to select construction logs, then the quality range of the construction logs so selected is limited, and the class may be considered a grade. If selection for construction logs is given first priority, it may be necessary to subdivide the class into grades.

[2]Included timber is always square, and dimension is judged from small end.

Softwood species were graded according to the fol lowing specifications on the following page.

Log Grades for Eastern White Pine

Log grade	Minimum size Diameter	Length[1]	Sweep or crook allowance	Total cull allowance including sweep	Maximum weevil injury	Allowable knot size (inches)[2] on three best faces or minimum clearness on four faces
	(Inches)	*(Feet)*	*(Percent)*		*(Number)*	*(Inches)*
1	12 & 13	8-16	20	50	0	Four faces clear full length
	14+	10-16	20	50	0	Two faces clear full length, or four faces clear 50 percent length (6 feet min. length)[3]
2	6+	8-16	30	50	0	Sound knots 1.e[4] D/6 and less than 3 inches.[5] Unsound knots: 1.e. 1½ inches and for: butt, logs 1.e. D/12, upper logs 1.e.D/10, or four faces clear 50 percent of length
3	6+	8-16	40	50	8-foot logs: 1 weevil 10-foot+ logs: 2 weevils	Sound knots 1.e.D/3 and less than 5 inches. Unsound knots 1.e. D/6 and less than 2½ inches.
4	6+	8-16	50	50	No limit	No limit

[1]Plus trim.
[2]Disregard all knots less than ½-inch diameter in all grades.
[3]The sum of the diameter of sound knots plus twice the sum of the diameter of unsound knots (in inches) in less than or equal to half of the diameter of the log (inches).
[4]l.e. means less than or equal to.
[5]D means d.i.b. of log at location of knot.

LOG GRADES FOR JACK PINE AND RED PINE

Grade 1: logs with three or four clear faces.[8]

Grade 2: logs with one or two clear faces.

Grade 3: logs with no clear faces.

After the tentative log grade is established, the log will be degraded one grade for each of the following, except that no log can be degraded below grade 3. Net scale after deduction for defect must be at least 50 percent of the gross contents of the log.

1. *Sweep.* Degrade any tentative 1 or 2 log one grade if sweep amounts to 3 or more inches and equals or exceeds one-third the diameter inside bark at small end.

2. *Heart rot.* Degrade any tentative 1 or 2 log one grade if conk, massed hyphae, or other evidence of advanced heart rot is found anywhere in it.

[8]*A face is one fourth of the circumference in width extending full length of the log. Clear faces are those free of: knots measuring more than ½-inch in diameter, overgrown knots of any size, holes more than ¼-inch in diameter. Faces may be rotated to obtain the maximum number of clear ones.*

LOG GRADES FOR ALL OTHER SOFTWOOD LOGS

Grade 1

1. Logs must be 16 inches in diameter or larger, 10 feet in length or longer, and have not more than 30 percent of gross scale deducted for defect.

2. Logs must be at least 75 percent clear on each of three faces.

3. All knots outside clear cutting must be sound and not more than 2½-inches in size.

Grade 2

1. Logs must be 12 inches in diameter or larger, 10 feet in length or longer, and have a net scale of at least 50 percent of the gross contents of the log after deduction for defect.

2. Logs must be at least 50 percent clear on each of three faces or 75 percent clear on two faces.

Grade 3

1. Logs must be 6 inches in diameter or larger, 8 feet in length or longer, and have a net scale of at least 50 percent of the gross contents of the log after deduction for defect.

Note: (A) Diameters are diameter inside bark (d.i.b.) at small end of log.
(B) Percent clear refers to percent clear in one continuous section.

TREE SPECIES GROUPS IN MICHIGAN[9]

SOFTWOODS
- Eastern white pine ..... *Pinus strobus*
- Red pine ..... *Pinus resinosa*
- Jack pine ..... *Pinus banksiana*
- White spruce ..... *Picea glauca*
- Black spruce ..... *Picea mariana*
- Balsam fir ..... *Abies balsamea*
- Eastern hemlock ..... *Tsuga canadensis*
- Tamarack ..... *Larix laricina*
- Northern white-cedar ..... *Thuja occidentalis*
- Other softwoods
  - Eastern redcedar ..... *Juniperus virginiana*
  - Norway spruce ..... *Picea abies*
  - Engelmann spruce ..... *Picea engelmannii*
  - Austrian pine ..... *Pinus nigra*
  - Scotch pine ..... *Pinus sylvestris*

HARDWOODS
- White oaks
  - White oak ..... *Quercus alba*
  - Swamp white oak ..... *Quercus bicolor*
  - Bur oak ..... *Quercus macrocarpa*
  - Chinkapin oak ..... *Quercus muehlenbergii*
  - Chestnut oak ..... *Quercus prinus*
- Select red oak
  - Northern red oak ..... *Quercus rubra*
- Other red oaks
  - Scarlet oak ..... *Quercus coccinea*
  - Northern pin oak ..... *Quercus ellipsoidalis*
  - Pin oak ..... *Quercus palustris*
  - Black oak ..... *Quercus velutina*
- Hickories
  - Bitternut hickory ..... *Carya cordiformis*
  - Pignut hickory ..... *Carya glabra*
  - Shellbark hickory ..... *Carya laciniosa*
  - Shagbark hickory ..... *Carya ovata*
  - Mockernut hickory ..... *Carya tomentosa*
- Yellow birch ..... *Betula alleghaniensis*
- Hard maples
  - Sugar maple ..... *Acer saccharum*
  - Black maple ..... *Acer nigrum*
- Soft maples
  - Red maple ..... *Acer rubrum*
  - Silver maple ..... *Acer saccharinum*
- American beech ..... *Fagus grandifolia*
- Ashes
  - White ash ..... *Fraxinus americana*
  - Black ash ..... *Fraxinus nigra*
  - Green ash ..... *Fraxinus pennsylvanica*
- Balsam poplar ..... *Populus balsamifera*
- Eastern cottonwood ..... *Populus deltoides*
- Aspens
  - Bigtooth aspen ..... *Populus grandidentata*
  - Quaking aspen ..... *Populus tremuloides*
- American basswood ..... *Tilia americana*
- Yellow-poplar ..... *Liriodendron tulipifera*
- Black walnut ..... *Juglans nigra*
- Black cherry ..... *Prunus serotina*
- Butternut ..... *Juglans cinerea*
- Elms
  - American elm ..... *Ulmus americana*
  - Slippery elm ..... *Ulmus rubra*
  - Rock elm ..... *Ulmus thomasi*
- Paper birch ..... *Betula papyrifera*
- Other hardwoods
  - Boxelder ..... *Acer negundo*
  - Sweet birch ..... *Betula lento*
  - River birch ..... *Betula nigra*
  - Black willow ..... *Salix nigra*
  - Ohio buckeye ..... *Aesculus glabra*
  - Flowering dogwood ..... *Cornus florida*
  - Honeylocust ..... *Gleditsia triacantho*
  - Osage-orange ..... *Maclura pomifera*
  - Black tupelo ..... *Nyssa sylvatica* var. *sylvatica*
  - Sycamore ..... *Platanus occidentalis*
  - Black locust ..... *Robinia pseudoacacia*
  - Sassafras ..... *Sassafras albidum*
  - Red mulberry ..... *Morus rubra*
  - American chestnut ..... *Castanea dentata*

[9] *The common and scientific names are based on, Little, Elbert L., 1979.*

METRIC EQUIVALENTS OF UNITS USED IN THIS REPORT

1 acre = 4,046.86 square meters or 0.405 hectare.
1,000 acres = 405 hectares.
Breast height = 1.4 meters above the ground.
1 cubic foot = 0.0283 cubic meter.
1 inch = 25.4 millimeters, 2.54 centimeters, or 0.0254 meter.
1 foot = 30.48 centimeters or 0.3048 meter.
1 pound = 0.454 kilogram.
1 ton = 0.907 metric ton.

DEFINITION OF TERMS

Acceptable trees.—Growing-stock trees of commercial species that meet specified standards of size and quality but do not qualify as desirable trees.

Area-condition classes.—*Class 10.*—Areas fully stocked with desirable trees but not overstocked.

Class 20.—Areas fully stocked with desirable trees but overstocked with all live trees.

Class 30.—Areas medium to fully stocked with desirable trees and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

Class 40.—Areas medium to fully stocked with desirable trees and with 30 percent or more of the area controlled by other trees and/or conditions that ordinarily prevent occupancy by desirable trees.

Class 50.—Areas poorly stocked with desirable trees but fully stocked with growing-stock trees.

Class 60.—Areas poorly stocked with desirable trees but with medium to full stocking of growing-stock trees.

Class 70.—Areas poorly stocked with desirable trees and poorly stocked with growing-stock trees.

Basal area.—The area in square feet of the cross section at breast height of a single tree. When the basal area of all trees in a stand are summed, the result is usually expressed as square feet of basal area per acre.

Biomass.—The above-ground volume of all live trees (including bark and foliage) reported in green tons. Biomass is made up of 5 components:

Growing-stock bole.—Biomass of a growing-stock tree from a 1-foot stump to a variable 4-inch top.

Growing-stock tops and limbs.—Biomass of a growing-stock tree from a 1-foot stump minus the growing-stock bole.

Cull bole.—Biomass of a cull tree from a 1-foot stump to a variable 4-inch top.

Cull tops and limbs.—Biomass of a cull tree from a 1-inch stump minus the cull bole.

1- to 5-inch trees.—Biomass of all live trees 1- to 5-inches in diameter at breast height.

Commercial forest land.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commercial forest land have the capability of producing in excess of 20 cubic feet per acre per year of annual growth under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.) Also see definition of pastured commercial forest land.

Commercial species.—Tree species presently or prospectively suitable for industrial wood products. (Note: Excludes species of typically small size, poor form, or inferior quality such as hophornbeam and hawthorn.)

County and municipal land.—Lands owned by counties and local public agencies or municipalities, or lands leased to these governmental units for 50 years or more.

Cull.—Portions of a tree that are unusable for industrial wood products, because of rot, form, or other defect.

Desirable trees.—Growing-stock trees having no serious defects in quality limiting present or prospective use, and of relatively high vigor, and containing no pathogens that may result in death or serious deterioration before rotation age. These are trees that would be favored by forest managers in silvicultural operations.

Diameter classes.—A classification of trees based on diameter outside bark, measured at breast height (4-½ feet above the ground). (Note: d.b.h. is the common abbreviation for diameter at breast height. Two-inch diameter classes are commonly used in Forest Inventory and Analysis tables, with the even inch the approximate midpoint for a class. For example, the 6-inch class includes trees 5.0 through 6.9 inches d.b.h. inclusive).

Farm.—Any land from which $1,000 or more of agricultural products were grown and sold or normally would have been sold during the year.

Farmer-owned land.—Land owned by farm operators. (Note: Excludes land leased by farm operators from nonfarm owners, such as railroad companies and States.)

Forest land.—Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. (Note: Stocking is measured by comparison of basal area and/or number of trees, by age or size and spacing with specified standards.) The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas shall be classed as forest if less than 120 feet wide. Also see definitions for land area, commercial forest land, noncommercial forest land, productive-reserved forest land, stocking, unproductive forest land, and water.

Forest industry land.—Land owned by companies or individuals operating primary wood-using plants.

Forest trees.—Woody plants having a well-developed stem and usually more than 12 feet in height at maturity.

Forest type.—A classification of forest land based upon the species forming a plurality of live tree

stocking. Major forest types in Michigan are:

Jack pine.—Forests in which jack pine comprises a plurality of the stocking. (Common associates include eastern white pine, red pine, aspen, birch, and maple.)

Red pine.—Forests in which red pine comprises a plurality of the stocking. (Common associates include eastern white pine, jack pine, aspen, birch, and maple.)

White pine.—Forests in which eastern white pine comprises a plurality of the stocking. (Common associates include red pine, jack pine, aspen, birch, and maple.)

Balsam fir.—Forests in which balsam fir and white spruce comprise a plurality of stocking with balsam fir the most common. (Common associates include white spruce, aspen, maple, birch, northern white-cedar, and tamarack.)

White spruce.—Forests in which white spruce and balsam fir comprise a plurality of the stocking with white spruce the most common. (Common associates include balsam fir, aspen, maple, birch, northern white-cedar, and tamarack.)

Black spruce.—Forests in which swamp conifers comprise a plurality of the stocking with black spruce the most common. (Common associates include tamarack and northern white-cedar.)

Northern white-cedar.—Forests in which swamp conifers comprise a plurality of the stocking with northern white-cedar the most common. (Common associates include tamarack and black spruce.)

Tamarack.—Forests in which swamp conifers comprise a plurality of the stocking with tamarack the most common. (Common associates include black spruce and northern white-cedar.)

Oak-hickory.—Forests in which northern red oak, white oak, bur oak, or hickories, singly or in combination, comprise a plurality of the stocking. (Common associates include jack pine, beech, yellow-poplar, elm, and maple.)

Elm-ash-soft maple.—Forests in which lowland elm, ash, cottonwood, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include birches, spruce, and balsam fir.)

Maple-birch—Forests in which sugar maple, basswood, yellow birch, upland American elm, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include white pine, elm, hemlock, and basswood.)

Aspen.—Forests in which quaking aspen or bigtooth aspen, singly or in combination, comprise a plurality of the stocking. (Common associates include balsam poplar, balsam fir, and paper birch.)

Paper birch.—Forests in which paper birch comprises a plurality of the stocking. (Common associates include maple, aspen, and balsam fir.)

Exotic.—Forests in which species not native to Michigan comprise a plurality of the stocking. (Mostly scotch pine plantations.)

Gross area.—The entire area of land and water as determined by the Bureau of the Census, 1970.

Growing-stock trees.—Live trees of commercial species qualifying as desirable and acceptable trees. (Note: Excludes rough, rotten, and dead trees.)

Growing-stock volume.—Net volume in cubic feet of growing-stock trees 5.0 inches d.b.h. and over, from a 1-foot stump to a minimum 4.0 inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs. Cubic feet can be converted to cords by dividing by 79 cubic feet per solid wood cord.

Hardwoods.—Dicotyledonous trees, usually broad-leaved and deciduous.

Idle farmland.—Includes former croplands, orchards, improved pastures, and farm sites not tended within the past 2 years and presently less than 16.7 percent stocked with trees.

Improved pasture.—Land currently improved for grazing by cultivation, seeding, irrigation, or clearing of trees or brush and less than 16.7 percent stocked with live trees.

Indian land.—Tribal lands held in fee but administered by the Federal Government.

Land area.—A. *Bureau of the Census.* The area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than one-eighth of a statute mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

B. *Forest Inventory and Analysis.* The same as the Bureau of the Census, except minimum width of streams, etc. is 120 feet and minimum size of lakes, etc. is 1 acre.

Live trees.—Growing-stock and rough and rotten trees 1 inch d.b.h. and larger.

Log grades.—A classification of logs based on external characteristics as indicators of quality or value. (See Appendix for specific grading factors used.)

Logging residues.—The unused growing-stock portions of trees cut or killed by logging.

Maintained road.—Any road, hard-topped or other surfaces, that is plowed or graded at least once a year. Includes rights-of-way that are cut or treated to limit herbaceous growth.

Marsh.—Nonforest land that characteristically supports low, generally herbaceous or shrubby vegetation and that is intermittently covered with water.

Merchantable.—Refers to a pulpwood or saw log section that meets pulpwood or saw log specifications, respectively.

Miscellaneous federal land.—Federal land other than National Forest and land administered by the Bureau of Land Management.

Miscellaneous private land.—Privately owned land other than forest-industry and farmer-owned land.

Mortality.—The volume of sound wood in growing-stock and sawtimber trees that die annually.

National Forest land.—Federal land that has been legally designated as National Forest or purchase units, and other land under the administration of the USDA Forest Service.

Net annual growth of growing stock.—The annual change in volume of sound wood in live sawtimber and poletimber trees and the total volume of trees entering these classes through ingrowth, less volume losses resulting from natural causes.

Net annual growth of sawtimber.—The annual change in the volume of live sawtimber trees and the total volume of trees reaching sawtimber size, less volume losses resulting from natural causes.

Net volume.—Gross volume less deductions for rot, sweep, or other defect affecting use for timber products.

Noncommercial forest land.—(a) Unproductive forest land and (b) productive-reserved forest land.

Noncommercial species.—Tree species of typically small size, poor form, or inferior quality which normally do not develop into trees suitable for industrial wood products.

Nonforest land.—Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide and more than 1 acre in area, to qualify as nonforest land.)

a. *Nonforest land without trees.*—Nonforest land with no live trees present.

b. *Nonforest land with trees.*—Nonforest land with one or more trees per acre at least 5 inches d.b.h.

Nonstocked land.—Commercial forest land less than 16.7 percent stocked with growing-stock trees.

Other removals.—Growing-stock trees removed but not utilized for products, or trees left standing but "removed" from the commercial forest land classification by land use change. Examples are removals from cultural operations such as timber stand improvement work, land clearing, and changes in land use.

Ownership.—Property owned by one owner, regardless of the number of parcels in a specified area.

Ownership size class.—The amount of commercial forest land owned by one owner, regardless of the number or parcels.

Owner tenure.—The length of time a property has been held by the owner.

Physiographic class.—A measure of soil and water conditions that affect tree growth on a site. The physiographic classes are:

Xeric sites.—Very dry soils where excessive drainage seriously limits both growth and species occurrence. Example: sandy jack pine plains.

Xeromesic sites.—Moderately dry soils where excessive drainage limits growth and species occurrence to some extent. Example: dry oak ridge.

Mesic sites.—Deep, well-drained soils. Growth and species occurrence are limited only by climate.

Hydromesic sites.—Moderately wet soils where insufficient drainage or infrequent flooding limits growth and species occurrence to some extent. Example: better drained bottomland hardwood sites.

Hydric sites.—Very wet sites where excess water seriously limits both growth and species occurrence. Example: wet, frequently flooded river bottoms and spruce bogs.

Plant byproducts.—Plant residues used for products such as mulch, pulp chips, and fuelwood.

Plant residues.—Wood and bark materials generated at manufacturing plants during production of other products.

Poletimber stands.—(See stand-size class.)

Poletimber trees.—Growing-stock trees of commercial species at least 5.0 inches d.b.h., but smaller than sawtimber size.

Productive-reserved forest land.—Forest land sufficiently productive to qualify as commercial forest land but withdrawn from timber utilization through statute, administration regulation, designation, or exclusive use for Christmas tree production, as indicated by annual shearing.

Rotten trees.—Live trees of commercial species that do not contain at least one 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, and/or do not meet Regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume in a tree is rotten.

Rough trees.—(a) Live trees of commercial species that do not contain at least one merchantable 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, and/or do not meet Regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Roundwood products.—Logs, bolts, or other round sections (including chips from roundwood) cut from trees for industrial or consumer uses. (Note: Includes saw logs, veneer logs and bolts; cooperage logs and bolts; pulpwood; fuelwood; piling; poles; posts; hewn ties; mine timbers; and various other round, split, or hewn products.)

Salvable dead trees.—Standing or down dead trees that are considered merchantable by Regional standards.

Saplings.—Live trees 1 to 5 inches d.b.h.

Sapling-seedling stands.—(See stand-size class.)

Saw log.—A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter outside bark (d.o.b.) for softwoods of 7 inches (9 inches for hardwoods) or other combinations of size and defect specified by Regional standards.

Saw log portion.—That part of the bole of sawtimber trees between the stump and the saw log top.

Saw log top.—The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw log top is 7 inches d.o.b. for softwoods and 9 inches d.o.b. for hardwoods.

Sawtimber stands.—(See stand-size class.)

Sawtimber trees.—Growing-stock trees of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting Regional specifications for freedom from defect. Softwoods must be at least 9 inches d.b.h. Hardwoods must be at least 11 inches d.b.h.

Sawtimber volume.—Net volume of the saw log portion of live sawtimber trees in board feet, International 1/4-inch rule, from stump to a minimum 7 inches top diameter outside bark (d.o.b.) for softwoods and a minimum 9 inches top d.o.b. for hardwoods.

Seedlings.—Live trees less than 1 inch d.b.h. that are expected to survive. Only softwood seedlings more than 6 inches tall and hardwood seedlings more than 1 foot tall are counted.

Short-log (rough tree).—Sawtimber-size trees of commercial species that contain at least one merchantable 8- to 11-foot saw log but not a 12-foot saw log.

Shrub.—A woody, perennial plant differing from a perennial herb in its persistent and woody stem(s), and less definitely from a tree in its lower stature and the general absence of a well-defined main stem. For this report shrubs were separated somewhat arbitrarily into tall and low shrubs as follows:

Tall shrubs.—Shrubs whose normal height is usually greater than 1.6 to 3.2 feet (0.5 to 1.0 meter).

Low shrubs.—Shrubs whose normal height is usually less than 1.6 to 3.2 feet (0.5 to 1.0 meter). (Woody perennial vines, such as grape, may be included with low shrubs).

Shrub biomass.—The total above-ground weight (including the bark) of selected shrubs and trees less than 1 inch d.b.h.

Site class.—A classification of forest land in terms of inherent capacity to grow crops of industrial wood based on fully stocked natural stands.

Site index.—An expression of forest site quality based on the height of a free-growing dominant or codominant tree of a representative species in the forest type at age 50.

Softwoods.—Coniferous trees, usually evergreen, having needles or scale-like leaves.

Stand.—A growth of trees on a minimum of 1 acre of forest land that is stocked by forest trees of any size.

Stand-age class.—Age of the main stand. Main stand refers to trees of the dominant forest type and stand-size class.

Stand-area class.—The extent of a continuous forested area of the same forest type, stand-size class, and stand-density class.

Stand-size class.—A classification of forest land based on the size class of growing-stock trees on the area; that is, sawtimber, poletimber or seedlings and saplings.

a. *Sawtimber stands.*—Stands at least 16.7 percent stocked with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

b. *Poletimber stands.*—Stands at least 16.7 percent stocked with growing-stock trees of which half or more of this stocking is in poletimber and/or sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

c. *Sapling-seedling stands.*—Stands at least 16.7 percent stocked with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

d. *Nonstocked stands.*—Stands in which stocking of growing-stock trees is less than 16.7 percent.

State land.—Land owned by States, or land leased to these governmental units for 50 years or more.

tocking.—The degree of occupancy of land by trees, measured by basal area and/or the number of trees in a stand by size or age and spacing, compared to the basal area and/or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

A stocking percent of 100 indicates full utilization of the site and is equivalent to 80 square feet of basal area per acre in trees 5 inches d.b.h. and larger. In a stand of trees less than 5 inches d.b.h., a stocking percent of 100 would indicate that the present number of trees is sufficient to produce 80 square feet of basal area per acre when the trees reach 5 inches d.b.h.

Stands are grouped into the following stocking classes:

Overstocked stands.—Stands in which stocking of trees is 134.0 percent or more.

Fully stocked stands.—Stands in which stocking of trees is from 101.0 to 133.9 percent.

Medium stocked stands.—Stands in which stocking of trees is from 61.0 to 100.9 percent.

Poorly stocked stands.—Stands in which stocking of trees is from 16.7 to 60.9 percent.

Nonstocked areas.—Commercial forest land on which stocking of trees is less than 16.7 percent.

imber removals from growing stock.—The volume of sound wood in growing-stock trees removed annually for forest products (including roundwood products and logging residues) and for other removals.

imber removals from sawtimber.—The net board-foot volume of live sawtimber trees removed for forest products annually (including roundwood products and logging residues) and for other removals.

imber products output.—All timber products cut from roundwood and byproducts of wood manufacturing plants. Roundwood products include logs, bolts, or other round sections cut from growing-stock trees, cull trees, salvable dead trees, trees on nonforest land, noncommercial species, sapling-size trees, and limbwood. Byproducts from primary manufacturing plants include slabs, edgings, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and screenings of pulpmills that are used as pulpwood chips or other products.

Tree biomass.—The total aboveground weight (including the bark) of all trees 1 to 5 inches in d.b.h., and the total aboveground weight (including the bark) from a 1-foot stump for trees more than 5 inches in diameter.

Tree size class.—A classification of trees based on diameter at breast height, including sawtimber trees, poletimber trees, saplings, and seedlings.

Unproductive forest land.—Forest land incapable of producing 20 cubic feet per acre of annual growth or of yielding crops of industrial wood under natural conditions because of adverse site conditions. (Note: Adverse conditions include shallow soils, dry climate, poor drainage, high elevation, steepness, and rockiness.)

Upper stem portion.—That part of the bole of sawtimber trees above the saw log top to a minimum top diameter of 4 inches outside bark or to the point where the central stem breaks into limbs.

Urban and other areas.—Areas within the legal boundaries of cities and towns; suburban areas developed for residential, industrial, or recreational purposes; schoolyards, cemeteries, roads; railroads; airports; beaches; powerlines; and other rights-of-way; or other nonforest land not included in any other specified land use class.

Water.—(a) *Bureau of the Census.*—Streams, sloughs, estuaries, and canals more than one-eighth of a statute mile wide; and lakes, reservoirs, and ponds more than 40 acres in area.

(b) *Noncensus.*—The same as the Bureau of the Census, except minimum width of streams, etc. is 120 feet and minimum size of lakes, etc. is 1 acre.

Wooded pasture.—Improved pasture with more than 16.7 percent stocking in live trees but less than 25 percent stocking in growing-stock trees. Area is currently improved for grazing or there is other evidence of grazing.

Wooded strip.—An acre or more of natural continuous forest land that would otherwise meet survey standards for commercial forest land except that it is less than 120 feet wide.

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Table 7.--Net volume of growing stock on commercial forest land by species group, Michigan, 1966 and 1980

(In million cubic feet)

Species group	1966[1/]	1980
SOFTWOODS		
White pine	384.6	543.6
Red pine	287.0	713.9
Jack pine	392.8	628.2
White spruce	272.5	396.7
Black spruce	257.0	343.5
Balsam fir	740.4	780.8
Hemlock	519.1	486.7
Tamarack	84.7	108.2
Northern white-cedar	1,056.9	1,297.9
Other softwoods	5.8	56.1
Total	4,000.8	5,355.6
HARDWOODS		
Select white oak	440.3	561.6
Select red oak	740.9	1,166.2
Other red oak	416.5	291.0
Hickory	102.8	105.5
Yellow birch	510.6	466.6
Hard maple	2,275.3	2,748.8
Soft maple	1,266.7	2,252.8
Beech	409.5	337.9
Ash	502.2	677.2
Balsam poplar	174.4	240.7
Cottonwood	73.7	70.6
Bigtooth aspen	673.9	903.4
Quaking aspen	1,448.9	1,714.0
Basswood	463.5	668.3
Yellow-poplar	8.0	19.4
Black walnut	3.2	26.8
Black cherry	162.8	313.7
Butternut	--	3.7
Elm	692.3	278.3
Paper birch	631.8	813.8
Other hardwoods	51.9	87.9
Total	11,049.2	13,748.2
All species	15,050.0	19,103.8

[1/] Figures have been adjusted from those published after the 1966 survey to conform to 1980 volumes because of changes in survey definitions and procedures.

Table 8.--Net volume of all live trees on commercial forest land by species group and diameter class, Michigan, 1980

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS													
White pine	560,093	25,794	40,539	52,556	54,779	77,221	67,902	62,448	51,446	44,909	65,386	16,638	475
Red pine	720,491	184,272	185,287	108,192	77,163	49,566	50,313	33,317	18,697	9,231	4,453	--	--
Jack pine	650,001	168,312	221,015	155,730	61,083	28,974	10,069	4,345	365	108	--	--	--
White spruce	404,068	55,072	68,520	90,609	69,252	55,360	32,560	19,270	6,783	3,722	2,920	--	--
Black spruce	346,427	163,621	107,436	44,629	16,006	5,595	3,198	762	5,180	--	--	--	--
Balsam fir	794,962	302,866	248,720	143,844	67,886	21,596	7,792	1,514	--	--	744	--	--
Hemlock	524,783	25,206	45,134	59,319	77,255	86,151	77,983	51,424	39,868	27,012	30,787	4,558	86
Tamarack	112,877	41,034	29,543	24,310	10,017	4,607	2,662	317	68	319	--	--	--
Northern white-cedar	1,454,692	419,634	377,810	265,909	166,975	100,490	56,160	28,879	15,957	10,214	10,377	1,975	312
Other softwoods	63,831	30,983	17,890	8,666	3,450	2,671	52	--	119	--	--	--	--
Total	5,632,225	1,416,794	1,341,894	953,764	603,866	432,231	308,691	202,276	138,483	95,515	114,667	23,171	873
HARDWOODS													
Select white oaks	594,196	66,867	89,964	91,532	81,483	61,412	59,494	42,108	31,014	19,207	31,175	16,715	3,225
Select red oaks	1,219,008	88,843	161,254	214,263	202,330	165,773	132,186	97,008	59,549	38,808	47,053	11,354	587
Other red oaks	311,800	31,060	45,095	55,425	53,994	39,196	29,766	26,519	9,963	7,355	10,512	2,915	--
Hickory	108,551	8,177	17,430	24,613	20,797	14,277	8,816	6,691	2,885	2,325	1,680	396	464
Yellow birch	574,515	58,919	77,035	79,871	70,705	75,386	64,020	47,448	31,720	22,950	31,366	11,627	3,468
Hard maple	2,960,143	529,470	564,421	492,055	369,124	302,233	258,381	179,063	108,503	53,464	77,899	22,562	2,968
Soft maple	2,437,840	453,807	522,816	446,715	328,429	240,164	159,488	101,029	65,717	37,142	52,829	20,536	9,168
Beech	404,636	38,943	43,337	48,940	51,499	62,612	52,194	42,711	25,912	15,904	20,077	2,507	--
Ash	714,225	155,726	139,413	130,297	101,034	70,132	48,245	28,017	16,147	8,767	12,287	3,429	731
Balsam poplar	252,236	21,518	36,453	39,387	42,746	40,877	30,595	17,611	11,837	6,734	3,130	1,348	--
Cottonwood	71,861	3,502	4,451	9,397	6,817	7,237	10,182	4,044	5,386	5,393	8,050	5,204	2,198
Bigtooth aspen	955,512	122,681	210,333	245,224	192,317	102,581	45,931	22,057	7,241	4,097	3,050	--	--
Quaking aspen	1,887,212	290,235	426,547	440,874	351,412	199,153	107,063	45,038	19,434	5,408	1,583	465	--
Basswood	698,091	77,926	130,199	155,313	122,743	85,142	54,780	33,190	16,928	9,269	9,255	1,704	1,642
Yellow-poplar	19,425	1,065	1,337	1,295	1,950	2,982	3,209	879	4,016	1,757	935	--	--
Black walnut	27,846	2,491	2,776	5,063	3,590	4,380	4,423	1,633	1,052	1,228	619	591	--
Black cherry	366,824	64,689	89,910	74,701	57,428	39,940	19,225	10,126	5,691	3,675	926	513	--
Butternut	4,844	639	1,002	892	495	955	180	170	--	177	334	--	--
Elm	302,534	60,783	63,031	51,237	43,518	33,423	19,087	12,941	8,879	3,049	3,886	2,584	116
Paper birch	873,794	219,761	262,840	197,062	110,836	47,885	23,092	7,070	2,801	1,374	960	113	--
Other hardwoods	105,271	19,624	15,390	16,702	9,665	10,221	7,484	2,826	5,240	2,959	8,823	5,226	1,111
Noncommercial species	79,629	37,878	22,110	11,518	4,081	2,416	348	338	738	202	--	--	--
Total	14,969,993	2,354,604	2,927,144	2,832,376	2,226,993	1,608,377	1,138,189	728,517	440,653	251,244	326,429	109,789	25,678
All species	20,602,218	3,771,398	4,269,038	3,786,140	2,830,859	2,040,608	1,446,880	930,793	579,136	346,759	441,096	132,960	26,551

Table 9.--Net volume of timber on commercial forest land by class of timber and softwoods and hardwoods, Michigan, 1980

(In thousand cubic feet)

Class of timber	All species	Softwoods	Hardwoods
LIVE TREES			
Growing-stock trees			
Sawtimber			
Saw log portion	7,667,408	2,389,052	5,278,356
Upper stem portion	1,262,675	320,030	942,645
Subtotal	8,930,083	2,709,082	6,221,001
Poletimber	10,173,717	2,646,517	7,527,200
Total	19,103,800	5,355,599	13,748,201
Cull trees			
Rough and rotten cull trees			
Sawtimber	516,866	106,336	410,530
Poletimber	695,122	112,176	582,946
Subtotal	1,211,988	218,512	993,476
Short-log trees	286,430	58,114	228,316
Total	1,498,418	276,625	1,221,793
TOTAL LIVE TREES	20,602,218	5,632,225	14,969,993
SALVABLE DEAD TREES	627,545	224,256	403,289
ALL CLASSES	21,229,763	5,856,481	15,373,282

Table 10.--Net volume of growing stock, sawtimber, short-log, and rough and rotten trees on commercial forest land by individual species, Michigan, 1980

Species	Total all live	Growing stock	Short-log cull	Rough and rotten cull	Sawtimber
		Thousand cubic feet			Thousand board feet[1/]
SOFTWOODS					
White pine	560,093	543,535	4,499	12,059	2,606,707
Red pine	720,491	713,841	696	5,954	1,890,783
Jack pine	650,001	628,201	3,797	18,003	1,300,487
Scotch pine	55,617	49,638	227	5,752	65,036
Austrian pine	6,728	5,071	155	1,502	2,385
White spruce	404,068	396,698	1,592	5,778	1,395,518
Norway spruce	498	498	—	—	--
Engelmann spruce	81	81	--	—	--
Black spruce	346,427	343,499	360	2,568	364,731
Balsam fir	794,962	780,816	2,743	11,403	1,086,763
Hemlock	524,783	486,735	12,079	25,969	2,389,793
Tamarack	112,877	108,188	515	4,174	191,493
Northern white cedar	1,454,692	1,297,942	31,451	125,299	2,648,562
Eastern redcedar	907	856	--	51	3,261
Total	5,632,225	5,355,599	58,114	218,512	13,945,519
HARDWOODS					
White oak	531,510	502,387	7,055	22,068	1,542,569
Bur oak	18,961	17,447	649	865	74,940
Swamp white oak	43,165	41,317	284	1,564	173,564
Chestnut oak	112	--	--	112	--
Chinkapin oak	448	448	--	--	--
Northern red oak	1,219,009	1,166,227	16,311	36,471	3,903,389
Scarlet oak	2,580	2,391	--	189	3,888
Northern pin oak	66,164	63,521	807	1,836	197,118
Pin oak	1,580	1,580	--	--	4,228
Black oak	241,475	223,544	2,949	14,982	725,930
Bitternut hickory	36,180	35,035	251	894	96,731
Shellbark hickory	3,603	3,418	--	185	11,290
Shagbark hickory	52,315	50,831	703	781	164,711
Mockernut hickory	3,128	3,128	--	--	11,066
Pignut hickory	13,324	13,057	202	65	47,773
Yellow birch	574,515	466,546	28,097	79,872	1,516,165
Black maple	904	699	--	205	3,166
Sugar maple	2,959,238	2,748,073	53,501	157,664	6,994,696
Red maple	2,285,162	2,109,068	34,003	142,091	4,342,198
Silver maple	152,679	143,684	1,288	7,707	471,028
Beech	404,636	337,921	14,703	52,012	1,240,413
White ash	382,040	370,065	4,617	7,358	990,737
Black ash	263,535	243,469	1,503	18,563	342,237
Green ash	68,650	63,697	1,591	3,362	136,195
Balsam poplar	252,236	240,668	1,691	9,877	811,808
Eastern cottonwood	71,862	70,608	92	1,162	291,306
Bigtooth aspen	955,513	903,436	8,056	44,021	1,842,998
Quaking aspen	1,887,213	1,713,956	21,989	151,268	3,460,406
Basswood	698,092	668,337	6,136	23,619	1,772,951
Hackberry	679	679	--	--	2,391
American elm	279,846	257,874	4,689	17,283	604,467
Slippery elm	14,381	13,425	--	956	19,598
Rock elm	8,306	6,955	135	1,216	8,891
Paper birch	873,794	813,842	8,451	51,501	910,295
Chestnut	296	110	--	186	--
Black tupelo	2,865	2,430	--	435	4,357
Sycamore	13,416	13,228	--	188	56,740
Butternut	4,844	3,662	--	1,182	8,952
Black walnut	27,846	26,773	288	785	84,707
Black cherry	366,822	313,738	6,053	47,031	593,837
Yellow-poplar	19,425	19,425	--	--	87,069
Boxelder	6,850	4,981	336	1,533	3,676
Ohio buckeye	393	393	--	--	665
Sweet birch	104	104	--	--	--
River birch	336	336	--	--	878
Flowering dogwood	696	--	--	696	--
Honeylocust	1,518	1,425	--	93	--
Osage orange	329	329	--	--	--
Red mulberry	694	97	--	597	--
Black locust	3,099	2,790	--	309	4,328
Black willow	36,328	30,122	1,705	4,501	120,166
Sassafras	37,668	30,925	181	6,562	39,099
Noncommercial species	79,629	—	--	79,629	--
Total	14,969,993	13,748,201	228,316	993,476	33,723,617
All species	20,602,218	19,103,800	286,430	1,211,988	47,669,136

[1/] International 1/4-inch rule.

Table 11.--Net volume of noncommercial species on commercial forest land by individual species, Michigan, 1980

(In thousand cubic feet)

Species	Cull volume
Striped maple	1,771
Mountain maple	3,078
Ailanthus	540
American hornbeam	1,186
Eastern hophornbeam	56,959
Eastern redbud	--
Hawthorn	3,801
Apple	5,669
Pin cherry	2,317
Chokecherry	2,288
Mountain ash	1,434
Peachleaf willow	586
Diamond willow	--
All species	79,629

Table 12.--Net volume of growing stock on commercial forest land by species group and Forest Survey Unit, Michigan, 1980

(In thousand cubic feet)

Species group	All Units	Forest Survey Unit: Eastern Upper Peninsula	Western Upper Peninsula	Northern Lower Peninsula	Southern Lower Peninsula
SOFTWOODS					
White pine	543,535	146,073	153,771	176,763	66,928
Red pine	713,841	138,860	73,688	452,495	48,798
Jack pine	628,201	174,266	104,739	335,918	13,278
White spruce	396,698	148,642	207,633	38,705	1,718
Black spruce	343,499	170,997	136,530	35,972	--
Balsam fir	780,816	259,257	405,475	115,899	185
Hemlock	486,735	133,434	281,531	64,960	6,810
Tamarack	108,188	42,467	34,916	26,795	4,010
Northern white-cedar	1,297,942	532,848	330,049	431,116	3,929
Other softwoods	56,144	1,440	337	28,428	25,939
Total	5,355,599	1,748,284	1,728,669	1,707,051	171,595
HARDWOODS					
Select white oaks	561,599	358	769	251,160	309,312
Select red oaks	1,166,227	21,707	85,076	721,458	337,986
Other red oaks	291,036	--	--	180,189	110,847
Hickory	105,470	--	--	1,838	103,632
Yellow birch	466,546	99,743	321,572	37,604	7,627
Hard maple	2,748,772	536,418	1,404,710	692,984	114,660
Soft maple	2,252,752	477,453	628,509	748,355	398,435
Beech	337,921	168,298	488	121,689	47,446
Ash	677,231	66,641	130,790	251,892	227,908
Balsam poplar	240,668	89,733	42,799	98,083	10,053
Cottonwood	70,608	368	73	10,261	59,906
Bigtooth aspen	903,436	66,570	104,484	653,639	78,743
Quaking aspen	1,713,956	363,836	643,017	630,943	76,160
Basswood	668,337	50,367	209,228	325,173	83,569
Yellow-poplar	19,425	--	--	--	19,425
Black walnut	26,773	--	--	200	26,573
Black cherry	313,738	49,645	53,658	94,087	116,348
Butternut	3,662	--	--	278	3,384
Elm	278,253	41,158	148,178	30,117	58,800
Paper birch	813,842	253,926	282,834	256,960	20,122
Other hardwoods	87,949	239	177	10,705	76,828
Total	13,748,201	2,286,460	4,056,362	5,117,615	2,287,764
All species	19,103,800	4,034,744	5,785,031	6,824,666	2,459,359

Table 13.--Net volume of sawtimber on commercial forest land by species group and Forest Survey Unit, Michigan, 1980

(In thousand board feet)[1/]

Species group	All Units	Forest Survey Unit			
		Eastern Upper Peninsula	Western Upper Peninsula	Northern Lower Peninsula	Southern Lower Peninsula
SOFTWOODS					
White pine	2,606,707	736,589	780,033	811,402	278,683
Red pine	1,890,783	447,746	279,874	1,053,736	109,427
Jack pine	1,300,487	309,368	276,692	684,828	29,599
White spruce	1,395,518	527,783	745,345	121,852	538
Black spruce	364,731	169,698	153,343	41,690	--
Balsam fir	1,086,763	323,226	610,899	151,930	708
Hemlock	2,389,793	661,391	1,444,202	252,871	31,329
Tamarack	191,493	66,942	61,261	56,260	7,030
Northern white-cedar	2,648,562	996,280	994,377	653,206	4,699
Other softwoods	70,682	1,602	589	11,647	56,844
Total	13,945,519	4,240,625	5,346,615	3,839,422	518,857
HARDWOODS					
Select white oaks	1,791,072	637	3,693	572,193	1,214,549
Select red oaks	3,903,389	65,731	298,531	2,159,690	1,379,437
Other red oaks	931,164	--	--	488,102	443,062
Hickory	331,572	--	--	5,588	325,984
Yellow birch	1,516,165	367,659	1,049,376	77,578	21,552
Hard maple	6,997,862	1,366,336	4,009,886	1,188,575	433,065
Soft maple	4,813,225	947,043	1,168,709	1,450,072	1,247,401
Beech	1,240,413	653,154	821	389,470	196,968
Ash	1,469,167	88,096	278,324	487,434	615,313
Balsam poplar	811,808	278,417	153,205	353,766	26,420
Cottonwood	291,306	1,936	371	42,830	246,169
Bigtooth aspen	1,842,998	112,159	242,428	1,339,410	149,001
Quaking aspen	3,460,406	638,290	1,360,347	1,366,066	95,703
Basswood	1,772,955	132,115	505,144	834,836	300,860
Yellow-poplar	87,069	--	--	--	87,069
Black walnut	84,707	--	--	--	84,707
Black cherry	593,837	91,220	55,406	172,403	274,808
Butternut	8,952	--	--	1,427	7,525
Elm	632,956	124,011	396,325	44,130	68,490
Paper birch	910,295	287,113	376,599	233,758	12,825
Other hardwoods	232,299	665	432	35,432	195,770
Total	33,723,617	5,154,582	9,899,597	11,242,760	7,426,678
All species	47,669,136	9,395,207	15,246,212	15,082,182	7,945,535

[1/] International 1/4-inch rule.

Table 14.--Net volume of growing stock on commercial forest land by species group and diameter class, Michigan, 1980

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS													
White pine	543,535	23,688	38,480	49,740	51,529	75,803	66,833	61,706	50,733	44,569	63,782	16,197	475
Red pine	713,841	181,571	183,334	107,177	76,587	49,565	50,314	33,060	18,617	9,163	4,453	--	--
Jack pine	628,201	161,131	214,979	151,117	60,108	26,655	9,580	4,158	365	108	--	--	--
White spruce	396,698	51,265	67,840	89,604	68,753	54,405	32,559	18,942	6,688	3,722	2,920	--	--
Black spruce	343,499	162,554	106,254	44,180	15,775	5,595	3,199	762	5,180	--	--	--	--
Balsam fir	780,816	298,257	244,577	141,120	66,420	20,806	7,680	1,212	--	--	744	--	--
Hemlock	486,735	21,975	40,360	52,226	70,607	81,244	73,999	48,787	37,871	25,444	29,831	4,305	86
Tamarack	108,188	39,079	28,198	23,517	9,761	4,366	2,601	278	68	320	--	--	--
Northern white-cedar	1,297,942	393,828	346,857	232,620	144,362	84,872	47,112	21,617	11,973	7,157	6,408	1,136	--
Other softwoods	56,144	26,612	15,677	8,159	2,906	2,671	--	--	119	--	--	--	--
Total	5,355,599	1,359,960	1,286,556	899,460	566,808	405,982	293,877	190,522	131,614	90,483	108,138	21,638	561
HARDWOODS													
Select white oaks	561,599	62,124	86,854	87,544	77,328	58,380	57,757	40,455	29,584	17,452	27,804	13,914	2,403
Select red oaks	1,166,227	85,143	156,629	204,332	193,432	158,695	128,701	93,810	56,135	36,308	43,073	9,382	587
Other red oaks	291,036	26,836	40,386	52,047	51,101	37,246	28,913	25,737	9,748	6,985	9,652	2,385	--
Hickory	105,470	8,016	17,430	23,692	20,032	13,929	8,566	6,489	2,885	2,076	1,495	396	464
Yellow birch	466,546	52,657	67,576	68,527	57,294	63,422	52,118	38,612	22,929	16,500	18,547	5,300	3,064
Hard maple	2,748,772	502,732	530,603	459,286	335,868	281,621	243,518	165,461	99,710	48,778	63,805	15,903	1,487
Soft maple	2,252,752	429,805	493,406	414,115	301,108	221,054	144,524	91,909	59,153	32,010	44,491	17,474	3,703
Beech	337,921	35,378	37,685	43,271	42,456	52,269	45,644	34,208	21,231	12,516	11,365	1,898	--
Ash	677,231	146,630	131,018	125,333	96,186	66,853	46,582	26,584	15,316	8,198	11,147	3,152	232
Balsam poplar	240,668	20,722	35,160	37,959	40,179	38,331	29,023	16,944	11,594	6,524	2,884	1,348	--
Cottonwood	70,608	3,150	4,451	9,201	6,817	7,238	10,180	3,908	5,386	5,164	8,050	5,204	1,859
Bigtooth aspen	903,436	114,004	200,945	239,113	182,635	95,937	39,974	20,035	6,173	2,490	2,130	--	--
Quaking aspen	1,713,956	263,758	397,878	408,671	321,016	177,489	88,523	36,677	15,041	3,491	947	465	--
Basswood	668,337	73,299	125,989	151,210	117,253	81,734	52,619	32,174	14,888	7,831	8,270	1,428	1,642
Yellow-poplar	19,425	1,064	1,337	1,295	1,950	2,982	3,209	879	4,017	1,757	935	--	--
Black walnut	26,773	2,491	2,776	4,892	3,279	4,380	4,422	1,633	1,052	1,229	619	--	--
Black cherry	313,738	51,386	79,507	63,079	48,932	35,993	16,210	9,257	5,252	3,198	709	215	--
Butternut	3,662	639	575	649	495	954	180	170	--	--	--	--	--
Elm	278,253	57,035	58,511	46,050	40,044	30,672	18,169	11,789	8,119	2,796	3,176	1,775	117
Paper birch	813,842	206,120	247,693	184,590	101,380	43,728	21,071	5,602	1,875	972	811	--	--
Other hardwoods	87,949	16,050	12,817	14,080	7,763	8,950	6,381	1,889	4,864	2,861	7,472	4,048	774
Total	13,748,201	2,159,039	2,729,226	2,638,936	2,046,548	1,481,857	1,046,284	664,222	394,952	219,136	267,382	84,287	16,332
All species	19,103,800	3,518,999	4,015,782	3,538,396	2,613,356	1,887,839	1,340,161	854,744	526,566	309,619	375,520	105,925	16,893

Table 15.--Net volume of sawtimber on commercial forest land by species group and diameter class, Michigan, 1980

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS											
White pine	2,606,707	245,752	262,912	395,792	359,203	335,441	282,865	253,983	369,197	98,512	3,050
Red pine	1,890,783	555,167	419,677	275,652	280,599	184,247	102,183	48,866	24,392	--	--
Jack pine	1,300,487	774,513	314,310	138,633	50,032	20,615	1,812	572	--	--	--
White spruce	1,395,518	441,510	340,707	273,359	167,499	99,231	35,886	20,752	16,574	--	--
Black spruce	364,731	201,770	78,275	29,730	18,267	4,423	32,266	--	--	--	--
Balsam fir	1,086,763	620,775	312,726	102,916	39,523	6,395	--	--	4,428	--	--
Hemlock	2,389,793	282,309	390,235	452,204	421,267	278,507	216,938	147,581	175,778	24,463	511
Tamarack	191,493	102,837	48,218	22,607	14,167	1,212	265	2,187	--	--	--
Northern white-cedar	2,648,562	1,083,495	683,362	406,348	231,607	107,404	60,092	36,485	33,700	6,069	--
Other softwoods	70,682	41,607	14,457	14,080	--	--	538	--	--	--	--
Total	13,945,519	4,349,735	2,864,879	2,111,321	1,582,164	1,037,475	732,845	510,426	624,069	129,044	3,561
HARDWOODS											
Select white oaks	1,791,072	--	403,874	320,643	322,193	230,985	171,607	99,935	155,806	75,595	10,434
Select red oaks	3,903,389	--	958,842	849,054	719,012	537,457	329,388	211,944	244,847	50,034	2,811
Other red oaks	931,164	--	250,367	202,759	164,531	148,723	54,996	40,504	55,784	13,500	--
Hickory	331,572	--	115,043	84,589	51,982	39,287	16,621	11,831	8,099	2,273	1,847
Yellow birch	1,516,165	--	309,403	350,194	292,626	218,088	124,685	91,907	94,375	23,210	11,677
Hard maple	6,997,862	--	1,719,165	1,574,287	1,409,004	979,582	587,289	281,607	353,767	84,781	8,380
Soft maple	4,813,225	--	1,500,241	1,188,124	792,436	506,791	320,791	166,163	229,346	90,080	19,253
Beech	1,240,413	--	226,904	296,528	267,600	199,702	119,532	67,196	54,859	8,092	--
Ash	1,469,167	--	494,039	359,718	257,378	148,361	85,018	45,869	61,564	16,261	959
Balsam poplar	811,808	--	237,986	215,608	156,487	89,373	59,036	33,545	13,602	6,171	--
Cottonwood	291,306	--	38,032	41,397	55,732	22,799	30,973	25,070	40,127	27,388	9,788
Bigtooth aspen	1,842,998	--	920,583	522,590	225,570	115,350	34,410	13,739	10,756	--	--
Quaking aspen	3,460,406	--	1,671,421	974,041	496,973	206,150	85,765	18,861	4,981	2,214	--
Basswood	1,772,955	--	629,342	460,074	306,248	185,936	86,081	45,558	45,738	7,525	6,453
Yellow-poplar	87,069	--	10,157	15,831	17,872	4,943	22,957	10,654	4,655	--	--
Black walnut	84,707	--	16,626	23,805	22,528	8,194	4,722	6,275	2,557	--	--
Black cherry	593,837	--	240,419	189,808	83,187	42,815	22,223	12,788	2,095	502	--
Butternut	8,952	--	2,357	4,771	1,002	822	--	--	--	--	--
Elm	632,956	--	226,609	170,183	96,668	60,434	41,216	13,209	15,634	8,436	567
Paper birch	910,295	--	527,494	227,962	106,895	28,965	9,769	5,114	4,096	--	--
Other hardwoods	232,299	--	39,871	45,846	30,617	10,021	25,590	14,366	39,893	21,729	4,366
Total	33,723,617	--	10,538,775	8,117,812	5,876,541	3,784,778	2,232,669	1,216,135	1,442,581	437,791	76,535
All species	47,669,136	4,349,735	13,403,654	10,229,133	7,458,705	4,822,253	2,965,514	1,726,561	2,066,650	566,835	80,096

[1/] International 1/4-inch rule.

Table 16.--Net volume of growing stock on commercial forest land by species group and forest type, Michigan, 1980

(In thousand cubic feet)

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
SOFTWOODS								
White pine	543,535	11,902	31,015	172,551	28,925	6,342	17,407	37,742
Red pine	713,841	58,444	499,773	25,852	4,596	1,824	6,365	1,844
Jack pine	628,201	461,954	61,819	4,609	697	976	17,877	--
White spruce	396,698	537	3,428	9,528	110,501	49,421	5,492	38,159
Black spruce	343,499	8,060	2,849	6,124	31,832	2,733	174,509	74,651
Balsam fir	780,816	1,100	4,497	8,198	210,614	11,437	23,845	107,103
Hemlock	486,735	--	1,337	2,064	8,873	174	2,310	13,608
Tamarack	108,188	211	292	590	5,896	497	13,815	34,340
Northern white-cedar	1,297,942	136	947	3,004	61,126	11,408	31,317	840,496
Other softwoods	56,144	--	3,185	5,557	81	1,678	77	1,029
Total	5,355,599	542,344	609,142	238,077	463,141	86,490	293,014	1,148,972
HARDWOODS								
Select white oaks	561,599	2,791	8,103	4,410	--	--	--	--
Select red oaks	1,166,227	31,761	15,069	8,034	498	--	--	--
Other red oaks	291,036	13,037	10,964	--	--	--	--	--
Hickory	105,470	306	--	--	--	--	--	--
Yellow birch	466,546	--	--	468	12,406	310	1,482	15,136
Hard maple	2,748,772	145	1,640	3,121	5,869	1,264	813	5,019
Soft maple	2,252,752	4,600	10,239	10,205	40,412	2,746	4,680	44,527
Beech	337,921	--	515	312	216	108	--	--
Ash	677,231	--	278	--	4,217	--	1,787	26,146
Balsam poplar	240,668	--	90	390	11,340	2,743	1,190	27,339
Cottonwood	70,608	--	--	--	--	--	--	--
Bigtooth aspen	903,436	3,539	11,685	3,447	2,162	215	1,995	5,280
Quaking aspen	1,713,956	14,681	13,378	13,659	58,582	16,604	24,248	28,504
Basswood	668,337	464	712	206	318	--	--	1,753
Yellow-poplar	19,425	--	344	--	--	--	--	--
Black walnut	26,773	--	200	--	--	--	--	--
Black cherry	313,738	365	2,304	971	3,753	1,347	316	705
Butternut	3,662	--	--	--	--	--	--	350
Elm	278,253	144	--	191	5,033	432	--	2,084
Paper birch	813,842	1,032	4,700	16,916	47,127	3,205	13,074	93,644
Other hardwoods	87,949	183	--	--	--	--	--	336
Total	13,748,201	73,048	80,221	62,330	191,933	28,974	49,585	250,823
All species	19,103,800	615,392	689,363	300,407	655,074	115,464	342,599	1,399,795

(Table 16 continued on next pag

ıble 16 continued)

ecies group	Forest type							
	Tamarack	Oak hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
FTWOODS								
White pine	1,283	29,318	16,928	125,352	55,255	7,570	1,779	166
Red pine	223	30,862	2,656	21,444	50,264	3,906	5,395	393
Jack pine	570	41,612	--	10,866	22,781	3,025	837	578
White spruce	53	700	14,481	84,845	66,443	13,078	--	32
Black spruce	5,512	390	7,721	11,631	14,401	2,969	--	117
Balsam fir	2,107	1,909	37,846	188,078	158,522	25,226	--	334
Hemlock	--	1,228	20,506	423,029	9,741	3,865	--	--
Tamarack	34,282	--	6,843	2,489	6,315	2,383	--	235
Northern white-cedar	6,026	402	73,348	133,030	107,608	28,822	109	163
Other softwoods	--	1,886	389	9,644	256	--	32,362	--
Total	50,056	108,307	180,718	1,010,408	491,586	90,844	40,482	2,018
RDWOODS								
Select white oaks	--	434,450	24,234	65,885	20,927	799	--	--
Select red oaks	--	744,332	12,490	221,794	123,867	7,415	809	158
Other red oaks	--	241,835	2,919	15,058	6,912	--	311	--
Hickory	--	61,941	2,953	39,599	500	171	--	--
Yellow birch	--	966	29,696	396,494	6,788	2,674	126	--
Hard maple	--	15,044	17,493	2,626,787	57,024	14,110	443	--
Soft maple	88	118,172	472,280	1,255,908	247,798	40,254	415	428
Beech	--	3,634	3,220	322,627	6,738	551	--	--
Ash	248	29,692	223,683	340,804	41,845	8,164	92	275
Balsam poplar	894	638	16,496	17,936	155,421	5,594	415	182
Cottonwood	--	5,979	33,311	21,019	10,299	--	--	--
Bigtooth aspen	--	116,647	8,105	160,182	577,838	12,307	--	34
Quaking aspen	1,434	25,033	57,237	331,814	1,089,695	37,583	1,192	312
Basswood	--	9,220	25,710	602,093	22,638	4,786	437	--
Yellow-poplar	--	2,537	1,945	14,599	--	--	--	--
Black walnut	--	18,533	2,782	5,258	--	--	--	--
Black cherry	--	46,643	18,029	214,027	23,694	645	627	312
Butternut	--	1,205	776	1,331	--	--	--	--
Elm	--	4,593	51,128	192,580	20,668	1,224	113	63
Paper birch	1,338	15,538	36,693	158,826	205,306	216,225	--	218
Other hardwoods	--	9,164	35,937	39,831	2,324	174	--	--
Total	4,002	1,905,796	1,077,117	7,044,452	2,620,282	352,676	4,980	1,982
l species	54,058	2,014,103	1,257,835	8,054,860	3,111,868	443,520	45,462	4,000

Table 17.--Net volume of sawtimber on commercial forest land by species group and forest type, Michigan, 1980

(In thousand board feet)[1/]

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white cedar
SOFTWOODS								
White pine	2,606,707	56,083	128,503	828,705	148,720	29,388	87,338	207,0
Red pine	1,890,783	207,759	1,092,156	118,307	22,596	8,101	26,939	9,9
Jack pine	1,300,487	925,465	114,400	14,144	1,473	3,177	46,222	
White spruce	1,395,518	2,243	5,145	32,189	400,011	140,131	21,352	136,8
Black spruce	364,731	4,124	3,427	8,844	55,703	3,462	129,699	93,8
Balsam fir	1,086,763	4,368	6,895	11,756	284,346	21,129	37,322	103,6
Hemlock	2,389,793	--	3,740	10,656	42,679	1,049	11,251	69,8
Tamarack	191,493	--	839	2,371	15,250	1,171	13,299	49,8
Northern white-cedar	2,648,562	--	1,028	4,989	168,235	24,352	86,486	1,526,2
Other softwoods	70,682	--	4,129	9,545	--	1,449	--	
Total	13,945,519	1,200,042	1,360,262	1,041,506	1,139,013	233,409	459,908	2,197,2
HARDWOODS								
Select white oaks	1,791,072	7,720	28,425	19,367	--	--	--	-
Select red oaks	3,903,389	75,759	60,740	16,939	--	--	--	-
Other red oaks	931,164	29,528	32,664	--	--	--	--	-
Hickory	331,572	1,337	--	--	--	--	--	-
Yellow birch	1,516,165	--	--	1,076	48,015	674	5,897	49,33
Hard maple	6,997,862	--	1,786	5,602	15,336	1,491	1,943	11,48
Soft maple	4,813,225	3,610	12,385	11,269	70,336	--	3,801	75,48
Beech	1,240,413	--	2,857	--	--	634	--	-
Ash	1,469,167	--	686	--	3,813	--	786	16,93
Balsam poplar	811,808	--	511	681	33,597	9,770	1,319	85,88
Cottonwood	291,306	--	--	--	--	--	--	-
Bigtooth aspen	1,842,998	3,914	12,941	6,801	9,487	1,235	1,252	19,57
Quaking aspen	3,460,406	4,399	4,879	18,101	102,656	19,864	18,856	84,06
Basswood	1,772,955	1,212	2,317	--	1,127	--	--	4,88
Yellow-poplar	87,069	--	--	--	--	--	--	-
Black walnut	84,707	--	--	--	--	--	--	-
Black cherry	593,837	--	2,261	1,847	2,127	3,160	--	45
Butternut	8,952	--	--	--	--	--	--	1,82
Elm	632,956	--	--	--	7,609	1,298	--	4,71
Paper birch	910,295	667	5,202	27,123	57,417	1,846	16,312	106,72
Other hardwoods	232,299	--	--	--	--	--	--	87
Total	33,723,617	128,146	167,654	108,806	351,520	39,972	50,166	462,22
All species	47,669,136	1,328,188	1,527,916	1,150,312	1,490,533	273,381	510,074	2,659,50

(Table 17 continued on next p

[1/] International 1/4-inch rule.

able 17 continued)

ecies group	Forest type							
	Tamarack	Oak hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
FTWOODS								
White pine	5,626	123,802	88,393	598,885	262,124	34,777	6,709	615
Red pine	1,175	92,455	10,881	71,883	205,124	18,773	3,568	1,161
Jack pine	2,506	95,371	--	25,135	53,470	13,711	4,183	1,230
White spruce	--	1,647	58,452	335,397	223,168	38,762	--	158
Black spruce	6,362	696	15,132	26,732	14,227	2,006	--	517
Balsam fir	1,503	2,132	45,254	334,135	210,542	23,129	--	619
Hemlock	--	4,655	90,970	2,108,068	33,196	13,649	--	--
Tamarack	57,353	--	15,435	12,574	19,002	3,190	--	1,116
Northern white-cedar	12,403	1,324	170,533	428,636	178,311	45,597	--	401
Other softwoods	--	9,284	--	10,708	538	--	35,029	--
Total	86,928	331,366	495,050	3,952,153	1,199,702	193,594	49,489	5,817
ARDWOODS								
Select white oaks	--	1,296,511	101,861	262,546	71,666	2,976	--	--
Select red oaks	--	2,391,024	52,234	901,657	382,868	20,282	972	914
Other red oaks	--	771,731	13,136	63,396	20,709	--	--	--
Hickory	--	194,063	7,907	125,213	2,102	950	--	--
Yellow birch	--	1,619	87,716	1,309,495	8,830	2,746	759	--
Hard maple	--	29,395	43,280	6,803,486	58,648	23,945	1,467	--
Soft maple	--	174,085	1,425,181	2,757,752	244,043	32,127	1,556	1,599
Beech	--	8,305	9,614	1,213,367	5,198	438	--	--
Ash	--	81,152	471,798	840,298	50,703	2,522	476	--
Balsam poplar	3,193	2,592	64,163	67,138	524,253	17,967	--	743
Cottonwood	--	30,343	122,000	93,323	45,640	--	--	--
Bigtooth aspen	--	194,329	20,154	436,493	1,108,032	28,787	--	--
Quaking aspen	2,090	23,213	135,407	874,387	2,089,131	83,360	--	--
Basswood	--	20,331	82,824	1,602,968	43,577	13,719	--	--
Yellow-poplar	--	12,171	11,117	63,781	--	--	--	--
Black walnut	--	63,602	7,117	13,988	--	--	--	--
Black cherry	--	99,467	43,926	408,161	30,675	--	1,757	--
Butternut	--	1,857	2,605	2,666	--	--	--	--
Elm	--	3,735	88,410	499,350	25,705	2,136	--	--
Paper birch	773	17,695	55,706	274,455	172,374	173,999	--	--
Other hardwoods	--	13,751	120,775	92,655	3,357	883	--	--
Total	6,056	5,430,971	2,966,931	18,706,575	4,887,511	406,837	6,987	3,256
11 species	92,984	5,762,337	3,461,981	22,658,728	6,087,213	600,431	56,476	9,073

Table 18.--Net volume of growing stock on commercial forest land by species group and ownership class, Michigan, 1980

(In thousand cubic feet)

Species group	All owners	Ownership class									
		National Forest	Bureau of Land Mgmt.	Misc. federal	Indian	State	County & municipal	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
SOFTWOODS											
White pine	543,535	71,803	--	420	--	143,919	3,076	62,007	51,182	73,680	137,448
Red pine	713,841	299,569	--	1,159	--	197,218	16,476	15,912	50,162	38,253	95,092
Jack pine	628,201	231,742	--	5,290	--	235,355	9,235	12,412	23,397	19,591	91,179
White spruce	396,698	99,104	--	844	336	68,625	1,989	72,882	31,569	52,630	68,719
Black spruce	343,499	87,732	--	94	149	101,819	3,182	56,850	16,454	25,289	51,930
Balsam fir	780,816	132,536	--	2,774	207	158,226	5,748	152,382	78,923	79,301	170,719
Hemlock	486,735	74,200	--	184	2,926	54,960	5,958	160,578	49,088	44,736	94,105
Tamarack	108,188	6,892	--	--	118	36,706	776	18,103	15,988	5,679	23,926
Northern white-cedar	1,297,942	112,202	--	242	509	334,415	10,355	230,070	197,862	133,630	278,657
Other softwoods	56,144	519	--	--	--	489	--	--	19,309	5,723	30,104
Total	5,355,599	1,116,299	--	11,007	4,245	1,331,732	56,795	781,196	533,934	478,512	1,041,879
HARDWOODS											
Select white oaks	561,599	65,370	--	746	--	79,858	3,710	1,515	159,411	37,002	213,987
Select red oaks	1,166,227	46,232	--	259	258	264,995	11,614	29,257	240,128	123,030	450,454
Other red oaks	291,036	127,334	--	414	--	24,074	3,457	1,487	37,170	9,580	87,520
Hickory	105,470	--	--	--	--	3,127	1,268	--	65,033	1,320	34,722
Yellow birch	466,546	83,450	--	1,348	3,879	48,908	5,050	148,567	33,869	56,980	84,495
Hard maple	2,748,772	384,544	--	379	9,827	307,853	26,335	615,682	500,156	287,078	616,918
Soft maple	2,252,752	269,855	--	1,506	5,924	379,071	19,259	305,003	403,680	235,554	632,900
Beech	337,921	43,943	--	--	--	35,432	2,084	75,704	78,217	21,466	81,075
Ash	677,231	52,200	--	95	682	76,048	10,141	54,736	213,810	48,155	221,364
Balsam poplar	240,668	7,358	--	--	237	51,545	118	25,682	60,068	18,241	77,419
Cottonwood	70,608	--	--	--	--	1,790	--	1,266	40,493	5,060	21,999
Bigtooth aspen	903,436	87,344	--	--	3,801	211,848	11,336	22,935	151,406	77,617	337,149
Quaking aspen	1,713,956	280,640	--	3,589	5,177	340,094	17,971	144,165	259,747	167,355	495,218
Basswood	668,337	68,435	--	--	624	115,920	5,355	52,784	169,803	58,674	196,742
Yellow-poplar	19,425	--	--	--	--	--	--	--	9,225	342	9,858
Black walnut	26,773	--	--	--	--	--	--	--	14,379	325	12,069
Black cherry	313,738	43,551	--	--	85	43,916	2,877	28,817	95,817	18,062	80,613
Butternut	3,662	--	--	--	--	--	471	--	1,903	325	963
Elm	278,253	46,227	--	156	842	32,190	4,265	37,993	61,883	23,933	70,764
Paper birch	813,842	99,472	--	1,864	526	192,338	2,774	100,739	116,873	85,376	213,880
Other hardwoods	87,949	--	--	--	--	2,536	1,813	348	32,658	6,793	43,801
Total	13,748,201	1,705,955	--	10,356	31,862	2,211,543	129,898	1,646,680	2,745,729	1,282,268	3,983,910
All species	19,103,800	2,822,254	--	21,363	36,107	3,543,275	186,693	2,427,876	3,279,663	1,760,780	5,025,789

Table 19.--Net volume of sawtimber on commercial forest land by species group and ownership class, Michigan, 1980

(In thousand board feet)[1/]

Species group	All owners	Ownership class									
		National Forest	Bureau of Land Mgmt.	Misc. federal	Indian	State	County & municipal	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
SOFTWOODS											
White pine	2,606,707	372,730	--	--	--	694,363	12,466	319,199	235,687	370,732	601,530
Red pine	1,890,783	572,681	--	5,931	--	693,096	51,655	67,808	95,694	115,959	287,959
Jack pine	1,300,487	411,769	--	11,800	--	501,957	19,055	27,381	59,418	63,338	205,769
White spruce	1,395,518	374,814	--	3,428	709	241,522	6,103	253,636	107,513	193,199	214,594
Black spruce	364,731	86,413	--	--	--	97,025	5,469	62,025	16,414	36,868	60,517
Balsam fir	1,086,763	190,226	--	8,155	428	218,627	8,988	203,815	89,393	124,874	242,257
Hemlock	2,389,793	384,936	--	1,062	15,318	261,926	28,492	834,703	210,855	222,938	429,563
Tamarack	191,493	9,045	--	--	--	55,670	1,460	33,953	31,210	15,350	44,805
Northern white-cedar	2,648,562	212,903	--	409	1,535	621,502	31,029	590,033	291,924	359,497	539,730
Other softwoods	70,682	1,800	--	--	--	--	--	--	18,400	11,143	39,339
Total	13,945,519	2,617,317	--	30,785	17,990	3,385,688	164,717	2,392,553	1,156,508	1,513,898	2,666,063
HARDWOODS											
Select white oaks	1,791,072	134,945	--	--	--	217,558	4,753	4,086	668,357	122,079	639,294
Select red oaks	3,903,389	138,126	--	886	1,410	737,124	31,612	96,353	978,841	407,642	1,511,395
Other red oaks	931,164	321,540	--	--	--	82,067	1,104	6,670	147,488	35,527	336,768
Hickory	331,572	--	--	--	--	5,920	4,603	--	204,827	3,962	112,260
Yellow birch	1,516,165	260,600	--	4,587	12,291	157,684	14,568	556,720	89,341	172,867	247,507
Hard maple	6,997,862	1,058,534	--	1,527	17,452	601,569	51,544	2,061,326	1,162,195	775,149	1,268,566
Soft maple	4,813,225	431,522	--	3,995	5,783	670,655	42,721	717,415	1,027,008	505,925	1,408,201
Beech	1,240,413	146,324	--	--	--	115,705	7,034	313,414	291,195	72,481	294,260
Ash	1,469,167	79,123	--	--	1,855	142,117	23,057	132,497	489,237	115,067	486,214
Balsam poplar	811,808	37,265	--	--	1,295	163,947	--	80,472	192,608	70,925	265,296
Cottonwood	291,306	--	--	--	--	9,101	--	6,805	171,798	15,811	87,791
Bigtooth aspen	1,842,998	122,224	--	--	10,541	406,538	33,178	55,701	359,401	161,933	693,482
Quaking aspen	3,460,406	528,501	--	--	8,265	703,293	30,176	279,609	524,340	381,148	1,005,074
Basswood	1,772,955	139,470	--	--	3,436	268,331	6,949	149,881	476,167	168,729	559,992
Yellow-poplar	87,069	--	--	--	--	--	--	--	44,619	1,480	40,970
Black walnut	84,707	--	--	--	--	--	--	--	44,944	--	39,763
Black cherry	593,837	74,218	--	--	--	81,652	2,053	34,957	220,347	28,097	152,513
Butternut	8,952	--	--	--	--	--	2,605	--	3,251	1,692	1,404
Elm	632,956	115,651	--	--	3,034	74,179	9,797	109,319	111,078	64,669	145,229
Paper birch	910,295	98,211	--	2,331	--	208,713	3,358	140,619	123,149	107,438	226,476
Other hardwoods	232,299	--	--	--	--	1,761	6,999	1,755	92,571	22,797	106,416
Total	33,723,617	3,686,254	--	13,326	65,362	4,647,914	276,111	4,747,599	7,422,762	3,235,418	9,628,871
All species	47,669,136	6,303,571	--	44,111	83,352	8,033,602	440,828	7,140,152	8,579,270	4,749,316	12,294,934

[1/] International 1/4-inch rule.

Table 20.--Net volume of growing stock on commercial forest land by forest type and stand-age class, Michigan, 1980

(In thousand cubic feet)

Forest type	All classes	Stand-age class (years)								
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90
Jack pine	615,392	18,064	31,194	39,905	118,623	196,292	103,018	46,685	43,209	11,921
Red pine	689,363	4,793	41,675	211,338	182,790	96,315	11,932	38,590	23,998	25,121
White pine	300,407	1,409	7,174	9,903	3,519	23,171	17,532	64,425	40,821	41,210
Balsam fir	655,074	22,275	27,869	21,273	65,961	166,790	103,224	75,671	56,369	33,749
White spruce	115,464	2,776	6,380	550	20,974	15,636	16,045	10,097	7,163	14,429
Black spruce	342,599	20,336	21,784	51,867	60,672	39,775	46,405	34,615	20,929	3,067
Northern white-cedar	1,399,795	9,314	20,087	39,295	41,300	59,906	142,568	184,924	169,968	188,128
Tamarack	54,058	3,761	6,488	5,686	1,777	3,249	11,564	7,516	4,094	1,686
Oak-hickory	2,014,103	57,066	49,435	14,251	99,431	228,999	349,390	262,105	264,484	207,987
Elm-ash-soft maple	1,257,835	53,302	55,065	50,454	111,034	120,713	143,501	118,266	130,197	140,663
Maple-birch	8,054,860	183,915	180,837	166,791	446,673	1,270,338	1,263,149	770,979	599,598	772,680
Aspen	3,111,868	202,827	203,564	86,556	402,194	626,643	637,859	368,606	260,640	130,945
Paper birch	443,520	13,173	10,805	5,020	29,841	53,730	144,223	100,170	39,853	12,418
Exotic	45,462	474	5,178	17,451	10,676	2,130	9,553	--	--	--
Nonstocked	4,000	674	614	310	396	702	806	--	--	498
All types	19,103,800	594,159	668,149	720,650	1,595,861	2,904,389	3,000,769	2,082,649	1,661,323	1,584,502

91-100	101-120	121-140	141+
3,936	1,667	878	--
17,043	33,823	1,945	--
36,042	20,581	24,198	10,422
25,265	34,626	15,696	6,306
--	17,297	--	4,117
8,474	17,834	10,661	6,180
137,008	206,687	104,044	96,566
4,238	2,025	--	1,974
127,770	275,994	68,391	8,800
81,289	161,304	65,493	26,554
697,995	1,034,839	473,650	193,416
92,231	86,108	13,695	--
18,144	5,355	8,160	2,628
--	--	--	--
--	--	--	--
1,249,435	1,898,140	786,811	356,963

Table 21.--Net volume of sawtimber on commercial forest land by forest type and stand-age class, Michigan, 1980

(In thousand board feet)[1/]

Forest type	All classes	Stand-age class (years)									
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Jack pine	1,328,188	34,476	58,976	41,761	246,450	346,649	259,384	140,922	137,978	37,069	16,750
Red pine	1,527,916	4,758	63,557	211,694	367,983	243,041	51,626	147,657	105,097	97,735	80,896
White pine	1,150,312	3,831	32,490	15,759	9,729	58,223	60,421	236,866	160,103	172,774	159,280
Balsam fir	1,490,533	46,060	45,458	34,011	103,618	412,748	187,869	151,232	145,324	99,527	80,621
White spruce	273,381	8,676	15,436	--	13,030	40,915	33,184	29,084	18,234	44,118	--
Black spruce	510,074	24,688	34,696	96,328	48,126	52,490	49,147	48,910	20,055	--	27,647
Northern white-cedar	2,659,509	12,064	25,631	37,382	38,966	90,494	190,913	230,074	217,745	326,995	321,321
Tamarack	92,984	7,040	13,529	9,183	1,014	3,518	14,236	10,619	9,796	962	10,118
Oak-hickory	5,762,337	161,827	148,812	26,855	174,678	443,567	574,879	602,320	920,610	761,422	498,250
Elm-ash-soft maple	3,461,981	117,039	98,156	68,647	216,754	211,150	353,058	266,998	396,219	524,978	281,896
Maple-birch	22,658,728	422,925	440,118	322,354	804,328	2,257,431	2,448,171	2,019,740	1,841,658	2,666,833	2,566,641
Aspen	6,087,213	319,782	318,709	116,412	556,031	927,480	1,122,453	906,525	760,533	408,156	303,926
Paper birch	600,431	18,994	15,468	1,184	33,495	70,562	153,035	114,094	73,246	28,408	47,952
Exotic	56,476	--	4,393	4,947	8,015	660	38,461	--	--	--	--
Nonstocked	9,073	379	568	--	--	3,175	3,304	--	--	1,647	--
All types	47,669,136	1,182,539	1,315,997	986,517	2,622,217	5,162,103	5,540,141	4,905,041	4,806,598	5,170,624	4,395,298

[1/] International 1/4-inch rule.

101-120	121-140	141+
5,119	2,654	--
147,960	5,912	--
87,615	107,124	46,097
108,906	51,487	23,672
59,800	--	10,904
56,370	31,922	19,695
547,186	310,918	309,820
5,151	--	7,818
1,092,677	315,899	40,541
622,227	212,300	92,559
4,006,027	1,982,844	879,658
300,890	46,316	--
16,802	20,603	6,588
--	--	--
--	--	--
7,056,730	3,087,979	1,437,352

Table 22.--Net volume of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Michigan, 1980

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)						
		0-10	11-20	21-30	31-40	41-50	51-60	61-70
Jack pine								
Sawtimber	155,794	--	--	1,956	4,528	14,559	17,817	30,078
Poletimber	400,160	--	1,041	5,903	7,504	38,393	21,069	38,172
Sapling & seedling	59,438	512	2,446	2,112	9,902	8,962	10,548	9,378
All stands	615,392	512	3,487	9,971	21,934	61,914	49,434	77,628
Red pine								
Sawtimber	221,394	--	619	--	4,439	5,782	1,378	10,741
Poletimber	428,759	--	--	--	1,238	4,638	6,594	9,923
Sapling & seedling	39,210	743	398	2,487	1,220	885	12,958	3,391
All stands	689,363	743	1,017	2,487	6,897	11,305	20,930	24,055
White pine								
Sawtimber	254,076	--	--	583	3,236	3,182	2,414	10,288
Poletimber	36,380	--	--	--	--	2,990	2,641	3,885
Sapling & seedling	9,951	283	765	1,587	846	1,453	1,914	3,103
All stands	300,407	283	765	2,170	4,082	7,625	6,969	17,276
Balsam fir								
Sawtimber	219,392	--	--	--	--	--	7,816	1,569
Poletimber	367,071	--	--	549	1,171	6,299	3,200	24,170
Sapling & seedling	68,611	129	2,110	2,498	8,326	9,964	6,245	12,061
All stands	655,074	129	2,110	3,047	9,497	16,263	17,261	37,800
White spruce								
Sawtimber	48,732	--	--	--	589	1,369	--	1,993
Poletimber	57,027	--	--	--	--	782	--	1,083
Sapling & seedling	9,705	--	643	502	1,228	1,236	1,004	1,522
All stands	115,464	--	643	502	1,817	3,387	1,004	4,598
Black spruce								
Sawtimber	17,665	--	--	--	--	--	1,330	--
Poletimber	251,865	174	--	710	28,464	4,343	9,853	10,205
Sapling & seedling	73,069	347	7,368	905	6,129	11,755	6,871	14,348
All stands	342,599	521	7,368	1,615	34,593	16,098	18,054	24,553
Northern white-cedar								
Sawtimber	491,375	--	--	--	2,403	1,679	3,030	6,397
Poletimber	821,372	--	--	--	1,709	944	2,625	7,854
Sapling & seedling	87,048	222	598	866	1,600	4,219	2,266	7,121
All stands	1,399,795	222	598	866	5,712	6,842	7,921	21,372

(Table 22 continued on next page)

(Table 22 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine							
Sawtimber	23,843	19,105	21,661	22,247	--	--	--
Poletimber	49,280	33,184	74,991	64,363	64,016	--	2,244
Sapling & seedling	8,037	2,500	--	--	5,041	--	--
All stands	81,160	54,789	96,652	86,610	69,057	--	2,244
Red pine							
Sawtimber	19,819	11,730	13,275	29,704	74,576	31,209	18,122
Poletimber	46,012	16,739	16,331	73,510	76,073	102,974	74,727
Sapling & seedling	10,329	4,608	--	1,199	992	--	--
All stands	76,160	33,077	29,606	104,413	151,641	134,183	92,849
White pine							
Sawtimber	27,331	17,584	27,675	60,640	17,189	83,954	--
Poletimber	5,647	4,000	1,772	11,060	4,385	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	32,978	21,584	29,447	71,700	21,574	83,954	--
Balsam fir							
Sawtimber	--	15,663	26,153	73,608	71,436	7,810	15,337
Poletimber	32,514	16,472	37,663	86,169	72,738	62,047	24,079
Sapling & seedling	6,047	7,146	6,654	3,333	3,171	927	--
All stands	38,561	39,281	70,470	163,110	147,345	70,784	39,416
White spruce							
Sawtimber	1,806	1,939	3,766	11,359	10,665	6,256	8,990
Poletimber	3,448	5,787	7,474	5,050	25,679	4,565	3,159
Sapling & seedling	2,336	--	--	1,234	--	--	--
All stands	7,590	7,726	11,240	17,643	36,344	10,821	12,149
Black spruce							
Sawtimber	4,358	1,529	--	1,618	8,830	--	--
Poletimber	8,021	9,790	27,322	82,011	40,656	14,358	15,958
Sapling & seedling	6,759	3,537	7,591	5,259	2,200	--	--
All stands	19,138	14,856	34,913	88,888	51,686	14,358	15,958
Northern white-cedar							
Sawtimber	7,521	--	19,388	88,636	91,448	113,702	157,171
Poletimber	14,173	15,196	27,027	81,877	198,750	195,079	276,138
Sapling & seedling	9,743	4,978	5,925	15,603	20,395	12,535	977
All stands	31,437	20,174	52,340	186,116	310,593	321,316	434,286

(Table 22 continued on next page)

(Table 22 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre) 0-10	11-20	21-30	31-40	41-50	51-60	61-70
Tamarack								
Sawtimber	8,873	--	--	962	1,004	1,974	--	--
Poletimber	27,784	--	--	--	1,725	2,559	2,901	7,085
Sapling & seedling	17,401	181	1,040	1,951	4,095	218	1,232	1,747
All stands	54,058	181	1,040	2,913	6,824	4,751	4,133	8,832
Oak-hickory								
Sawtimber	990,954	255	--	3,057	7,086	22,062	55,141	73,719
Poletimber	912,736	--	277	--	2,158	31,305	72,848	94,836
Sapling & seedling	110,413	875	8,111	7,429	21,796	30,624	14,980	22,308
All stands	2,014,103	1,130	8,388	10,486	31,040	83,991	142,969	190,863
Elm-ash-soft maple								
Sawtimber	649,082	--	--	3,655	13,917	25,752	16,304	33,758
Poletimber	477,181	--	1,738	4,151	11,928	24,411	7,626	34,802
Sapling & seedling	131,572	914	3,472	7,446	21,812	23,684	19,723	18,861
All stands	1,257,835	914	5,210	15,252	47,657	73,847	43,653	87,421
Maple-birch								
Sawtimber	4,038,539	--	1,226	--	8,815	35,600	33,400	125,212
Poletimber	3,587,998	--	890	4,507	16,053	36,006	43,385	142,326
Sapling & seedling	428,323	2,773	13,634	14,166	50,047	58,997	51,865	84,437
All stands	8,054,860	2,773	15,750	18,673	74,915	130,603	128,650	351,975
Aspen								
Sawtimber	799,355	--	597	1,109	7,933	30,847	15,977	44,781
Poletimber	1,874,948	--	1,094	3,123	29,197	51,827	66,430	145,005
Sapling & seedling	437,565	4,028	20,671	37,106	54,103	89,727	57,248	67,622
All stands	3,111,868	4,028	22,362	41,338	91,233	172,401	139,655	257,408
Paper birch								
Sawtimber	53,516	--	--	--	765	--	1,236	3,305
Poletimber	365,324	--	--	--	1,007	7,074	11,587	13,742
Sapling & seedling	24,680	129	174	1,149	1,632	4,845	2,098	4,775
All stands	443,520	129	174	1,149	3,404	11,919	14,921	21,822
Exotic								
Sawtimber	8,226	--	--	--	--	--	--	--
Poletimber	30,094	--	--	--	--	--	1,736	--
Sapling & seedling	7,142	--	269	304	323	162	--	1,156
All stands	45,462	--	269	304	323	162	1,736	1,156
Nonstocked	4,000	900	2,580	97	27	--	--	312
All types								
Sawtimber	7,956,973	255	2,442	11,322	54,715	142,806	155,843	341,841
Poletimber	9,638,699	174	5,040	18,943	102,154	211,571	252,495	533,088
Sapling & seedling	1,504,128	11,136	61,699	80,508	183,059	246,731	188,952	251,830
Nonstocked	4,000	900	2,580	97	27	--	--	312
All stands	19,103,800	12,465	71,761	110,870	339,955	601,108	597,290	1,127,071

(Table 22 continued on next page)

(Table 22 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack							
Sawtimber	2,977	--	--	--	1,956	--	--
Poletimber	3,337	5,269	3,058	1,850	--	--	--
Sapling & seedling	3,205	2,358	384	--	990	--	--
All stands	9,519	7,627	3,442	1,850	2,946	--	--
Oak-hickory							
Sawtimber	107,495	114,464	107,768	223,481	226,662	49,764	--
Poletimber	123,920	108,713	133,035	139,381	110,137	26,246	19,880
Sapling & seedling	1,015	764	1,394	1,117	--	--	--
All stands	232,430	223,941	242,197	413,979	336,799	76,010	19,880
Elm-ash-soft maple							
Sawtimber	67,783	35,523	30,781	128,938	194,241	84,087	14,343
Poletimber	56,797	25,492	100,472	67,240	81,191	54,604	6,729
Sapling & seedling	16,348	1,680	10,441	4,906	2,285	--	--
All stands	140,928	62,695	141,694	201,084	277,717	138,691	21,072
Maple-birch							
Sawtimber	257,458	216,101	488,271	870,610	1,320,863	500,924	180,059
Poletimber	231,336	234,968	423,831	859,513	1,132,279	417,909	44,995
Sapling & seedling	49,294	43,348	26,651	26,333	6,778	--	--
All stands	538,088	494,417	938,753	1,756,456	2,459,920	918,833	225,054
Aspen							
Sawtimber	68,009	54,658	89,495	103,810	216,115	102,651	63,373
Poletimber	163,464	172,970	260,517	277,124	412,698	220,337	71,162
Sapling & seedling	36,454	14,191	28,544	15,936	11,935	--	--
All stands	267,927	241,819	378,556	396,870	640,748	322,988	134,535
Paper birch							
Sawtimber	--	1,886	4,938	13,638	22,597	--	5,151
Poletimber	24,483	11,539	56,423	58,522	135,897	36,749	8,301
Sapling & seedling	1,934	3,644	2,176	2,124	--	--	--
All stands	26,417	17,069	63,537	74,284	158,494	36,749	13,452
Exotic							
Sawtimber	--	--	--	8,226	--	--	--
Poletimber	1,327	1,665	5,610	9,426	5,447	4,883	--
Sapling & seedling	3,372	--	1,133	--	423	--	--
All stands	4,699	1,665	6,743	17,652	5,870	4,883	--
Nonstocked	84	--	--	--	--	--	--
All types							
Sawtimber	588,400	490,182	833,171	1,636,515	2,256,578	980,357	462,546
Poletimber	763,759	661,784	1,175,526	1,867,096	2,359,946	1,139,751	547,372
Sapling & seedling	154,873	88,754	90,893	77,044	54,210	13,462	977
Nonstocked	84	--	--	--	--	--	--
All stands	1,507,116	1,240,720	2,099,590	3,580,655	4,670,734	2,133,570	1,010,895

Table 23.--Net volume of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Michigan, 1980

(In thousand board feet)[1/]

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)						
		0-10	11-20	21-30	31-40	41-50	51-60	61-70
Jack pine								
Sawtimber	565,568	--	--	7,462	16,816	56,434	76,081	103,591
Poletimber	657,940	--	2,399	11,564	14,819	105,876	41,274	78,844
Sapling & seedling	104,680	1,436	6,397	2,302	17,307	17,389	17,132	29,289
All stands	1,328,188	1,436	8,796	21,328	48,942	179,699	134,487	211,724
Red pine								
Sawtimber	899,007	--	3,362	--	18,961	25,661	6,944	49,333
Poletimber	567,799	--	--	--	3,141	7,891	12,169	12,992
Sapling & seedling	61,110	3,862	836	4,257	--	803	26,198	12,755
All stands	1,527,916	3,862	4,198	4,257	22,102	34,355	45,311	75,080
White pine								
Sawtimber	1,044,586	--	--	2,609	12,531	12,212	9,674	46,156
Poletimber	64,319	--	--	--	--	8,808	4,870	5,307
Sapling & seedling	41,407	1,545	4,020	7,551	4,205	2,858	11,851	9,377
All stands	1,150,312	1,545	4,020	10,160	16,736	23,878	26,395	60,840
Balsam fir								
Sawtimber	722,252	--	--	--	--	--	27,042	6,462
Poletimber	650,408	--	--	584	2,084	7,905	5,788	43,449
Sapling & seedling	117,873	360	2,870	8,631	17,311	22,274	9,553	15,479
All stands	1,490,533	360	2,870	9,215	19,395	30,179	42,383	65,390
White spruce								
Sawtimber	164,795	--	--	--	2,163	6,391	--	8,225
Poletimber	84,474	--	--	--	--	1,977	--	538
Sapling & seedling	24,112	--	1,278	2,243	1,466	5,783	1,253	4,170
All stands	273,381	--	1,278	2,243	3,629	14,151	1,253	12,933
Black spruce								
Sawtimber	56,719	--	--	--	--	--	5,380	--
Poletimber	366,163	--	--	1,378	74,612	5,200	11,548	15,079
Sapling & seedling	87,192	1,255	9,928	--	9,471	16,271	7,789	12,599
All stands	510,074	1,255	9,928	1,378	84,083	21,471	24,717	27,678
Northern white-cedar								
Sawtimber	1,561,526	--	--	--	10,196	4,605	13,792	21,674
Poletimber	1,010,917	--	--	--	3,309	1,357	1,989	10,361
Sapling & seedling	87,066	--	1,175	2,438	1,850	4,121	3,557	8,062
All stands	2,659,509	--	1,175	2,438	15,355	10,083	19,338	40,097

(Table 23 continued on next page

[1/] International 1/4-inch rule.

(Table 23 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine							
Sawtimber	88,405	67,664	81,033	68,082	--	--	--
Poletimber	86,242	46,099	136,337	53,283	80,249	--	954
Sapling & seedling	11,855	1,573	--	--	--	--	--
All stands	186,502	115,336	217,370	121,365	80,249	--	954
Red pine							
Sawtimber	88,986	43,477	53,846	123,381	295,193	109,671	80,192
Poletimber	82,651	11,560	4,181	102,408	93,201	154,172	83,433
Sapling & seedling	--	12,399	--	--	--	--	--
All stands	171,637	67,436	58,027	225,789	388,394	263,843	163,625
White pine							
Sawtimber	121,957	80,243	113,621	267,393	61,562	316,628	--
Poletimber	12,024	6,138	4,454	21,772	946	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	133,981	86,381	118,075	289,165	62,508	316,628	--
Balsam fir							
Sawtimber	--	50,556	89,116	259,683	216,223	23,387	49,783
Poletimber	60,909	22,045	64,121	160,729	116,412	130,044	36,338
Sapling & seedling	8,320	12,877	10,850	3,636	5,712	--	--
All stands	69,229	85,478	164,087	424,048	338,347	153,431	86,121
White spruce							
Sawtimber	5,909	5,942	11,650	34,692	37,877	23,909	28,037
Poletimber	3,243	8,089	17,577	10,788	26,841	9,233	6,188
Sapling & seedling	7,919	--	--	--	--	--	--
All stands	17,071	14,031	29,227	45,480	64,718	33,142	34,225
Black spruce							
Sawtimber	13,234	4,931	--	5,010	28,164	--	--
Poletimber	13,439	7,051	41,258	83,931	51,934	27,321	33,412
Sapling & seedling	6,631	8,097	11,101	1,819	2,231	--	--
All stands	33,304	20,079	52,359	90,760	82,329	27,321	33,412
Northern white-cedar							
Sawtimber	26,032	--	70,056	292,098	297,544	338,872	486,657
Poletimber	17,905	19,854	33,466	108,187	250,569	239,400	324,520
Sapling & seedling	8,903	9,725	3,660	21,062	13,358	7,870	1,285
All stands	52,840	29,579	107,182	421,347	561,471	586,142	812,462

(Table 23 continued on next page)

(Table 23 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre) 0-10	11-20	21-30	31-40	41-50	51-60	61-70
Tamarack								
Sawtimber	28,761	--	--	4,381	2,822	7,818	--	--
Poletimber	39,715	--	--	--	1,272	2,366	5,747	7,031
Sapling & seedling	24,508	--	4,174	1,986	5,860	--	2,549	4,556
All stands	92,984	--	4,174	6,367	9,954	10,184	8,296	11,587
Oak-hickory								
Sawtimber	3,916,254	1,467	--	12,313	30,916	82,351	244,510	299,502
Poletimber	1,535,137	--	493	--	839	47,061	122,699	173,377
Sapling & seedling	310,946	3,086	18,539	11,521	63,789	102,620	31,059	70,999
All stands	5,762,337	4,553	19,032	23,834	95,544	232,032	398,268	543,878
Elm-ash-soft maple								
Sawtimber	2,380,406	--	--	14,632	54,896	96,719	55,046	128,525
Poletimber	831,808	--	2,645	4,690	21,179	39,496	13,139	58,568
Sapling & seedling	249,767	2,306	7,530	14,949	37,010	55,662	20,846	38,543
All stands	3,461,981	2,306	10,175	34,271	113,085	191,877	89,031	225,636
Maple-birch								
Sawtimber	15,379,590	--	4,671	--	37,486	150,161	130,721	479,602
Poletimber	6,277,708	--	555	4,511	15,559	62,775	67,950	252,140
Sapling & seedling	1,001,430	9,694	32,703	32,821	103,752	125,833	108,475	181,976
All stands	22,658,728	9,694	37,929	37,332	156,797	338,769	307,146	913,718
Aspen								
Sawtimber	2,624,567	--	2,224	3,216	30,675	124,739	54,326	166,293
Poletimber	2,766,926	--	698	3,951	38,025	59,138	85,645	216,637
Sapling & seedling	695,720	12,854	34,946	61,708	88,434	160,232	108,817	89,672
All stands	6,087,213	12,854	37,868	68,875	157,134	344,109	248,788	472,602
Paper birch								
Sawtimber	148,584	--	--	--	2,932	--	3,865	9,276
Poletimber	423,382	--	--	--	2,792	10,726	9,907	18,819
Sapling & seedling	28,465	574	--	2,463	1,458	6,405	3,864	7,435
All stands	600,431	574	--	2,463	7,182	17,131	17,636	35,530
Exotic								
Sawtimber	35,326	--	--	--	--	--	--	--
Poletimber	15,785	--	--	--	--	--	2,176	--
Sapling & seedling	5,365	--	--	--	--	--	--	--
All stands	56,476	--	--	--	--	--	2,176	--
Nonstocked	9,073	158	8,695	--	--	--	--	--
All types								
Sawtimber	29,527,941	1,467	10,257	44,613	220,394	567,091	627,381	1,318,639
Poletimber	15,292,481	--	6,790	26,678	177,631	360,576	384,901	893,142
Sapling & seedling	2,839,641	36,972	124,396	152,870	351,913	520,251	352,943	484,912
Nonstocked	9,073	158	8,695	--	--	--	--	--
All stands	47,669,136	38,597	150,138	224,161	749,938	1,447,918	1,365,225	2,696,693

(Table 23 continued on next page)

(Table 23 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack							
Sawtimber	7,709	--	--	--	6,031	--	--
Poletimber	5,862	10,894	3,174	3,369	--	--	--
Sapling & seedling	1,016	3,057	--	--	1,310	--	--
All stands	14,587	13,951	3,174	3,369	7,341	--	--
Oak-hickory							
Sawtimber	440,653	440,446	407,294	860,106	894,092	202,604	--
Poletimber	226,828	193,518	194,792	330,986	174,966	39,610	29,968
Sapling & seedling	1,825	1,085	4,345	2,078	--	--	--
All stands	669,306	635,049	606,431	1,193,170	1,069,058	242,214	29,968
Elm-ash-soft maple							
Sawtimber	238,498	143,601	143,651	488,570	697,577	271,157	47,534
Poletimber	101,528	54,451	167,813	122,620	142,492	94,058	9,129
Sapling & seedling	44,608	1,246	17,515	6,203	3,349	--	--
All stands	384,634	199,298	328,979	617,393	843,418	365,215	56,663
Maple-birch							
Sawtimber	1,011,334	840,695	1,850,071	3,267,339	5,037,120	1,845,429	724,961
Poletimber	412,043	419,085	734,211	1,489,505	1,997,049	751,708	70,617
Sapling & seedling	137,413	107,944	74,609	76,171	10,039	--	--
All stands	1,560,790	1,367,724	2,658,891	4,833,015	7,044,208	2,597,137	795,578
Aspen							
Sawtimber	225,450	183,154	288,768	338,059	711,149	311,577	184,937
Poletimber	221,533	291,090	353,370	452,867	639,785	270,166	134,021
Sapling & seedling	53,704	28,197	29,694	20,018	7,444	--	--
All stands	500,687	502,441	671,832	810,944	1,358,378	581,743	318,958
Paper birch							
Sawtimber	--	6,127	14,179	37,210	57,139	--	17,856
Poletimber	26,982	8,511	60,107	66,713	155,682	55,906	7,237
Sapling & seedling	1,959	2,845	--	1,462	--	--	--
All stands	28,941	17,483	74,286	105,385	212,821	55,906	25,093
Exotic							
Sawtimber	--	--	--	35,326	--	--	--
Poletimber	3,134	--	1,621	6,536	1,599	719	--
Sapling & seedling	2,527	--	2,838	--	--	--	--
All stands	5,661	--	4,459	41,862	1,599	719	--
Nonstocked	220	--	--	--	--	--	--
All types							
Sawtimber	2,268,167	1,866,836	3,123,285	6,076,949	8,339,671	3,443,234	1,619,957
Poletimber	1,274,323	1,098,385	1,816,482	3,013,694	3,731,725	1,772,337	735,817
Sapling & seedling	286,680	189,045	154,612	132,449	43,443	7,870	1,285
Nonstocked	220	--	--	--	--	--	--
All stands	3,829,390	3,154,266	5,094,379	9,223,092	12,114,839	5,223,441	2,357,059

Table 24.--Net volume of sawtimber on commercial forest land by species group and log grade, Michigan, 1980

(In thousand board feet)[1/]

Species group	All grades	Log grade			
		1	2	3	Tie and timber
SOFTWOODS					
White pine	2,606,707	174,297	297,188	1,664,999	470,223
Red pine	1,890,783	52,174	47,663	1,717,109	73,837
Jack pine	1,300,487	699	23,243	1,266,563	9,982
White spruce	1,395,518	--	60,704	1,334,814	--
Black spruce	364,731	794	2,810	361,127	--
Balsam fir	1,086,763	3,018	915	1,050,501	32,329
Hemlock	2,389,793	45,092	177,649	2,139,378	27,674
Tamarack	191,493	5,901	9,144	176,448	--
Northern white-cedar	2,648,562	24,300	52,827	2,571,435	--
Other softwoods	70,682	--	--	70,682	--
Total	13,945,519	306,275	672,143	12,353,056	614,045
HARDWOODS					
Select white oaks	1,791,072	111,280	370,165	1,008,281	301,346
Select red oaks	3,903,389	263,367	851,413	2,233,453	555,156
Other red oaks	931,164	61,896	139,542	564,605	165,121
Hickory	331,572	11,075	73,422	209,468	37,607
Yellow birch	1,516,165	164,035	457,493	796,756	97,881
Hard maple	6,997,860	790,783	1,920,403	3,828,055	458,619
Soft maple	4,813,226	463,448	999,884	3,099,249	250,645
Beech	1,240,413	54,024	192,087	863,499	130,803
Ash	1,469,167	208,719	362,792	839,345	58,311
Balsam poplar	811,808	51,942	127,832	527,115	104,919
Cottonwood	291,306	53,582	50,377	179,926	7,421
Bigtooth aspen	1,842,998	41,419	335,989	1,345,127	120,463
Quaking aspen	3,460,407	78,242	417,725	2,481,202	483,238
Basswood	1,772,955	278,489	551,132	888,553	54,781
Yellow-poplar	87,069	25,987	20,980	38,059	2,043
Black walnut	84,707	4,713	1,043	67,999	10,952
Black cherry	593,837	36,257	3,463	479,208	74,909
Butternut	8,952	--	--	8,952	--
Elm	632,956	63,207	233,541	274,999	61,209
Paper birch	910,295	17,662	126,164	690,637	75,832
Other hardwoods	232,299	14,443	29,848	153,757	34,251
Total	33,723,617	2,794,570	7,265,295	20,578,245	3,085,507
All species	47,669,136	3,100,845	7,937,438	32,931,301	3,699,552

[1/] International 1/4-inch rule.

Table 25.--Net volume of growing stock on commercial forest land by species groups[1/] and county, Michigan, 1980

(In thousand cubic feet)

County	All species	Softwoods				Hardwoods				
		Pine	Spruce and balsam fir	Northern white-cedar	Other softwoods	Oaks	Hard maple	Soft maple	Aspen	Other hardwoods
EASTERN UPPER PENINSULA										
Alger	633,168	47,540	60,111	56,335	39,262	72	154,397	105,298	20,542	149,611
Chippewa	741,628	113,460	126,471	77,642	17,923	6,765	75,681	75,844	109,544	138,298
Delta	595,253	65,627	109,432	81,695	22,391	1,996	49,016	62,394	81,602	121,100
Luce	509,662	80,999	63,782	64,408	32,522	819	69,793	83,532	37,394	76,413
Mackinac	591,900	45,185	108,453	82,242	14,533	1,733	70,754	51,146	86,173	131,681
Menominee	458,744	20,569	40,986	102,783	25,122	10,594	66,268	28,540	54,172	109,710
Schoolcraft	504,389	85,819	69,661	67,743	25,588	86	50,509	70,699	40,979	93,305
Total	4,034,744	459,199	578,896	532,848	177,341	22,065	536,418	477,453	430,406	820,118
WESTERN UPPER PENINSULA										
Baraga	719,048	21,646	82,015	43,425	62,996	3,190	209,963	112,115	46,468	137,230
Dickinson	383,517	14,604	64,692	40,428	6,425	4,423	58,492	13,579	71,733	109,141
Gogebic	763,990	20,404	97,623	40,629	53,263	6,710	199,816	60,607	96,173	188,765
Houghton	718,181	40,391	59,926	28,043	36,211	10,270	223,250	102,832	83,857	133,401
Iron	785,974	45,338	135,241	25,712	33,593	6,354	185,935	54,797	121,792	177,212
Keweenaw	292,375	14,254	40,931	49,271	671	17,007	62,350	38,908	19,423	49,560
Marquette	1,264,465	139,207	175,883	78,037	76,888	33,636	268,226	164,385	129,608	198,595
Ontonagon	857,481	36,354	93,327	24,504	46,737	4,255	196,678	81,286	178,447	195,893
Total	5,785,031	332,198	749,638	330,049	316,784	85,845	1,404,710	628,509	747,501	1,189,797

(Table 25 continued on next page)

(Table 25 continued)

NORTHERN LOWER PENINSULA

County	All species	Softwoods				Hardwoods				
		Pine	Spruce and balsam fir	Northern white-cedar	Other softwoods	Oaks	Hard maple	Soft maple	Aspen	Other hardwoods
Alcona	313,422	40,462	13,155	16,470	1,183	88,518	7,547	28,078	58,774	59,235
Alpena	229,438	14,294	24,206	30,438	1,662	22,000	2,760	22,506	68,328	43,244
Antrim	204,488	1,861	4,526	10,369	6,025	--	60,526	20,066	34,591	66,524
Arenac	98,882	6,685	1,853	2,299	2,306	10,970	677	15,710	34,975	23,407
Bay	19,562	--	--	--	--	427	--	3,835	5,967	9,333
Benzie	143,591	9,391	779	2,960	6,706	978	47,710	23,314	13,112	38,641
Charlevoix	223,281	10,563	10,741	25,800	3,249	2,808	51,006	10,929	24,654	83,531
Cheboygan	366,166	39,281	28,795	40,998	5,380	12,666	50,720	22,792	81,759	83,775
Clare	198,788	30,218	1,872	9,898	1,814	54,814	1,838	31,427	47,939	18,968
Crawford	229,246	74,347	4,405	6,567	1,342	79,073	10,422	12,344	27,287	13,459
Emmet	256,988	3,249	9,408	12,099	5,102	5,729	77,468	16,725	56,687	70,521
Gladwin	161,384	8,749	1,053	1,184	199	17,458	0	26,163	77,030	29,548
Grand Traverse	164,917	30,698	184	11,306	7,483	20,109	18,654	21,552	36,134	18,797
Iosco	225,748	71,316	7,241	20,134	4,286	28,405	1,464	29,020	32,988	30,894
Isabella	71,290	801	113	4,716	4,750	13,547	530	11,909	24,449	10,475
Kalkaska	190,384	42,266	7,065	8,259	3,292	15,685	38,195	19,439	21,527	34,656
Lake	303,726	78,986	279	12,703	5,811	124,947	3,949	21,004	34,902	21,145
Leelanau	112,604	4,655	395	4,698	2,198	3,315	43,409	2,814	2,390	48,730
Manistee	244,928	32,801	363	6,884	3,340	49,935	41,325	49,949	21,847	38,484
Mason	152,245	18,830	278	4,153	4,634	49,681	6,870	24,836	29,207	13,756
Mecosta	104,234	8,326	938	5,043	3,230	11,495	6,226	12,095	33,967	22,914
Midland	135,485	8,308	--	--	1,234	21,020	211	29,714	48,921	26,077
Missaukee	185,718	16,998	4,046	10,824	4,355	26,936	19,964	32,510	40,245	29,840
Montmorency	229,593	37,289	9,494	14,493	4,604	39,815	18,556	24,287	40,390	40,665
Newaygo	326,936	56,204	358	5,210	7,099	129,375	8,743	49,776	33,858	36,313
Oceana	147,241	13,121	502	3,757	5,806	42,411	6,902	28,501	17,263	28,978
Ogemaw	226,851	22,487	4,600	14,254	404	47,173	5,415	23,790	69,022	39,706
Osceola	196,236	3,963	3,079	17,433	8,845	18,767	29,220	26,357	44,246	44,326
Oscoda	248,446	85,215	5,362	7,553	226	61,780	6,524	13,184	47,587	21,015
Otsego	286,118	41,242	11,361	12,226	1,922	12,777	78,851	18,681	35,522	73,536
Presque Isle	253,992	25,630	22,707	61,444	3,943	17,082	9,654	11,638	51,464	50,430
Roscommon	305,689	51,511	8,558	32,523	1,292	96,221	1,442	31,818	56,411	25,913
Wexford	267,049	75,429	2,860	14,421	6,461	26,890	36,206	31,592	31,139	42,051
Total	6,824,666	965,176	190,576	431,116	120,183	1,152,807	692,984	748,355	1,284,582	1,238,887

(Table 25 continued on next page)

(Table 25 continued)

SOUTHERN LOWER PENINSULA

County	All species	Softwoods				Hardwoods				
		Pine	Spruce and balsam fir	Northern white-cedar	Other softwoods	Oaks	Hard maple	Soft maple	Aspen	Other hardwoods
Allegan	160,301	27,845	--	--	5,245	56,637	1,542	21,681	6,970	40,381
Barry	147,582	3,697	1,082	--	1,009	60,818	17,838	21,122	2,539	39,477
Berrien	84,356	--	--	--	--	10,467	12,285	10,411	1,507	49,686
Branch	55,938	--	--	--	188	9,803	1,329	22,115	1,327	21,176
Calhoun	85,534	1,142	--	--	679	13,569	1,143	17,244	2,036	49,721
Cass	68,751	--	--	--	1,138	10,587	1,665	17,254	1,310	36,797
Clinton	19,817	--	--	--	--	4,507	538	5,533	1,009	8,230
Eaton	41,076	--	--	--	389	3,858	4,601	5,318	414	26,496
Genesee	37,485	--	--	--	--	10,648	4,558	7,753	886	13,640
Gratiot	29,548	1,168	--	--	--	11,819	1,190	7,814	2,247	5,310
Hillsdale	19,791	--	--	--	--	2,246	5,088	1,657	0	10,800
Huron	37,011	--	--	--	233	--	--	1,921	12,350	22,507
Ingham	44,819	135	166	--	--	8,636	3,378	4,774	3,810	23,920
Ionia	26,429	--	--	--	267	6,761	1,249	3,353	2,522	12,277
Jackson	95,732	--	--	--	205	43,985	--	6,930	3,619	40,993
Kalamazoo	47,733	5,412	256	--	5,966	8,737	308	7,611	3,483	15,960
Kent	117,307	1,375	--	--	1,043	50,336	9,246	24,980	5,924	24,403
Lapeer	64,384	2,637	185	--	206	19,783	6,901	11,551	3,315	19,806
Lenawee	44,036	--	--	--	--	8,229	6,598	5,462	1,691	22,056
Livingston	71,575	4,290	--	--	2,479	38,829	--	10,413	1,639	13,925
Macomb	26,901	--	--	662	810	970	3,560	11,309	189	9,401
Monroe	45,275	--	--	--	--	18,170	1,919	4,325	0	20,861
Montcalm	147,371	16,691	--	161	2,246	52,569	1,499	24,139	18,177	31,889
Muskegon	160,911	36,428	--	21	3,501	71,253	662	24,178	13,447	11,421
Oakland	62,889	730	--	--	--	31,024	827	6,571	2,592	21,145
Ottawa	93,034	12,384	--	--	8,220	22,358	3,544	21,360	1,594	23,574
Saginaw	60,154	1,222	--	--	142	21,155	2,739	8,129	8,045	18,722
St. Clair	91,786	7,713	--	--	1,236	27,420	5,114	7,622	3,654	39,027
St. Joseph	74,003	322	214	--	169	19,696	973	10,666	8,332	33,631
Sanilac	21,859	--	--	--	--	542	--	1,758	8,775	10,784
Shiawassee	72,960	--	--	--	--	23,823	2,543	12,426	2,724	31,444
Tuscola	77,239	1,012	--	3,085	330	4,294	5,406	19,149	23,076	20,887
Van Buren	99,113	4,801	--	--	261	22,177	5,117	19,675	2,778	44,304
Washtenaw	83,489	--	--	--	797	41,533	996	7,068	1,911	31,184
Wayne	43,170	--	--	--	--	20,906	304	5,163	1,011	15,786
Total	2,459,359	129,004	1,903	3,929	36,759	758,145	114,660	398,435	154,903	861,621
All units	19,103,800	1,885,577	1,521,013	1,297,942	651,067	2,018,862	2,748,772	2,252,752	2,617,392	4,110,423

1/ Species groups: other softwoods - primarily hemlock and tamarack; hard maple - sugar maple and black maple; soft maple - red maple and silver maple; other hardwoods - primarily hickory, yellow birch, beech, ash, balsam poplar, cottonwood, basswood, black walnut, black cherry, butternut, elm, and paper birch.

Table 26.--Net volume of sawtimber on commercial forest land by species groups[1/] and county, Michigan, 1980

(In thousand board feet)[2/]

County	All species	Softwoods				Hardwoods				
		Pine	Spruce and balsam fir	Northern white-cedar	Other softwoods	Oaks	Hard maple	Soft maple	Aspen	Other hardwoods
EASTERN UPPER PENINSULA										
Alger	1,888,985	171,606	121,978	153,667	201,655	--	452,443	234,842	47,845	504,949
Chippewa	1,659,894	281,372	224,959	158,395	75,491	22,147	162,544	166,851	223,007	345,128
Delta	1,134,546	182,729	192,669	113,780	85,011	8,531	116,505	76,781	108,284	250,256
Luce	1,466,285	307,316	105,318	177,581	148,731	546	223,358	194,900	75,217	233,318
Mackinac	1,240,067	159,628	210,043	132,121	53,326	2,236	177,115	85,204	148,235	272,159
Menominee	833,200	93,829	56,996	150,605	64,384	32,908	109,642	47,813	75,277	201,746
Schoolcraft	1,172,230	297,223	108,744	110,131	101,337	--	124,729	140,652	72,584	216,830
Total	9,395,207	1,493,703	1,020,707	996,280	729,935	66,368	1,366,336	947,043	750,449	2,024,386
WESTERN UPPER PENINSULA										
Baraga	2,253,770	89,154	170,599	163,114	320,593	9,741	700,785	264,384	124,313	411,087
Dickinson	698,953	62,812	103,940	69,513	10,092	18,140	67,583	12,024	123,693	231,156
Gogebic	1,926,524	57,673	190,692	136,366	254,132	20,201	535,635	108,544	202,912	420,369
Houghton	1,995,226	135,297	131,417	101,157	176,776	41,763	664,036	198,769	221,092	324,919
Iron	1,957,638	193,451	278,680	77,832	146,210	20,918	499,633	115,743	251,532	373,639
Keweenaw	830,853	73,835	97,469	155,233	2,570	70,995	171,170	87,305	46,280	125,996
Marquette	3,406,308	601,269	326,287	204,497	366,886	105,533	781,680	266,336	265,560	488,260
Ontonagon	2,176,940	123,108	210,503	86,665	228,793	14,933	589,364	115,604	367,393	440,577
Total	15,246,212	1,336,599	1,509,587	994,377	1,506,052	302,224	4,009,886	1,168,709	1,602,775	2,816,003

(Table 26 continued on next page)

(Table 26 continued)

NORTHERN LOWER PENINSULA

County	All species	Softwoods				Hardwoods				
		Pine	Spruce and balsam fir	Northern white-cedar	Other softwoods	Oaks	Hard maple	Soft maple	Aspen	Other hardwoods
Alcona	727,582	142,193	29,762	30,900	5,833	204,917	11,070	55,391	122,631	124,885
Alpena	492,107	57,617	52,600	57,222	4,459	51,746	3,921	45,207	155,184	64,151
Antrim	377,697	8,477	10,577	26,988	21,314	--	88,241	36,428	70,692	114,980
Arenac	199,998	17,707	--	691	2,507	29,977	--	28,175	70,913	50,028
Bay	46,778	--	--	--	--	1,845	--	10,030	14,286	20,617
Benzie	328,817	1,255	--	7,372	19,521	3,756	94,680	44,233	29,987	128,013
Charlevoix	508,496	41,698	19,850	30,721	9,373	11,494	97,973	19,884	87,645	189,858
Cheboygan	732,066	130,777	57,050	60,703	17,418	33,773	48,252	24,600	191,647	167,846
Clare	471,667	67,713	1,453	12,365	5,677	189,492	7,863	49,525	104,096	33,483
Crawford	413,157	195,389	3,834	2,834	6,727	131,191	7,858	4,482	31,319	29,523
Emmet	540,251	8,732	14,337	11,168	14,947	22,032	101,823	16,063	173,728	177,421
Gladwin	329,985	38,721	2,287	2,029	1,074	41,230	--	23,532	180,268	40,844
Grand Traverse	402,688	72,564	--	15,929	17,073	64,670	48,298	49,256	86,919	47,979
Iosco	488,497	170,730	14,932	31,517	20,107	47,785	4,944	61,470	71,113	65,899
Isabella	164,022	2,347	--	3,784	10,434	59,425	1,993	33,275	35,575	17,189
Kalkaska	368,373	112,243	9,748	14,438	6,400	43,997	52,453	23,615	37,899	67,580
Lake	677,970	161,110	--	10,070	6,061	354,939	6,484	26,172	64,503	48,631
Leelanau	334,699	12,647	--	5,051	8,263	15,594	94,814	12,742	7,168	178,420
Manistee	678,216	58,298	--	10,023	8,217	155,141	133,061	156,115	40,566	116,795
Mason	371,064	36,983	--	8,681	8,105	151,874	21,550	74,479	38,601	30,791
Mecosta	255,640	28,469	--	6,551	11,817	47,043	26,285	24,648	76,658	34,169
Midland	317,391	35,636	--	--	5,598	73,929	--	81,598	72,906	47,724
Missaukee	408,816	55,450	6,506	24,512	5,700	103,854	28,855	59,171	66,033	58,735
Montmorency	456,718	111,503	16,412	14,613	5,944	102,817	20,445	21,866	90,239	72,879
Newaygo	869,882	119,322	--	9,388	15,277	412,525	21,731	139,175	53,951	98,513
Oceana	384,521	29,661	--	4,040	13,835	147,203	15,787	76,242	29,552	68,201
Ogemaw	402,505	47,198	5,572	17,659	1,223	88,262	3,256	38,680	141,617	59,038
Osceola	562,103	14,854	3,774	34,045	37,301	63,417	79,125	56,062	147,669	125,856
Oscoda	563,867	242,294	8,969	14,690	749	155,227	6,518	16,373	78,714	40,333
Otsego	564,076	140,038	15,044	18,541	10,378	41,845	89,465	23,082	67,062	158,621
Presque Isle	451,144	77,895	35,563	99,105	8,149	38,859	12,363	13,502	89,192	76,516
Roscommon	680,326	195,916	6,135	51,881	1,967	220,516	--	43,345	124,846	35,720
Wexford	511,063	114,529	1,067	15,695	9,330	109,610	59,467	61,654	52,297	87,414
Total	15,082,182	2,549,966	315,472	653,206	320,778	3,219,985	1,188,575	1,450,072	2,705,476	2,678,652

(Table 26 continued on next page)

(Table 26 continued)

SOUTHERN LOWER PENINSULA

County	All species	Softwoods				Hardwoods				
		Pine	Spruce and balsam fir	Northern white-cedar	Other softwoods	Oaks	Hard maple	Soft maple	Aspen	Other hardwoods
Allegan	492,180	71,134	--	--	4,995	195,853	6,499	78,264	10,011	125,424
Barry	537,729	9,830	538	--	2,175	264,323	79,424	65,286	1,891	114,262
Berrien	275,389	--	--	--	--	35,117	32,882	24,298	1,642	181,450
Branch	181,734	--	--	--	872	44,207	3,160	76,340	3,163	53,992
Calhoun	305,140	1,547	--	--	1,522	69,475	3,129	55,811	3,680	169,976
Cass	236,371	--	--	--	--	49,622	6,470	73,364	--	106,915
Clinton	50,482	--	--	--	--	16,550	1,133	14,242	1,611	16,946
Eaton	109,286	--	--	--	--	15,065	13,264	22,617	2,601	55,739
Genesee	131,120	--	--	--	--	43,238	23,107	34,137	--	30,638
Gratiot	103,047	2,707	--	--	--	38,753	4,106	33,015	4,938	19,528
Hillsdale	70,940	--	--	--	--	11,837	26,994	3,665	--	28,444
Huron	86,377	--	--	--	--	--	--	1,893	20,950	63,534
Ingham	149,933	660	--	--	--	36,616	16,107	15,669	13,493	67,388
Ionia	90,927	--	--	--	--	35,127	3,557	11,983	3,894	36,366
Jackson	339,305	--	--	--	--	199,038	--	28,562	11,238	100,467
Kalamazoo	149,446	22,306	--	--	12,243	37,892	--	27,789	7,605	41,611
Kent	312,539	6,011	--	--	1,070	165,445	35,213	49,936	--	54,864
Lapeer	175,221	950	708	--	--	74,567	20,877	37,123	1,403	39,593
Lenawee	158,283	--	--	--	--	42,055	28,687	11,064	6,305	70,172
Livingston	266,465	10,032	--	--	8,070	172,238	--	32,138	4,227	39,760
Macomb	97,340	--	--	--	3,799	2,828	16,422	39,432	--	34,859
Monroe	167,546	--	--	--	--	82,093	12,271	22,239	--	50,943
Montcalm	392,071	55,673	--	212	5,166	167,569	1,595	58,336	29,508	74,012
Muskegon	476,093	132,499	--	26	19,116	212,241	4	71,006	21,253	19,948
Oakland	251,416	2,605	--	--	--	148,702	3,061	28,203	--	68,845
Ottawa	321,864	32,461	--	--	30,273	79,066	13,198	70,418	--	96,448
Saginaw	148,425	6,564	--	--	--	78,557	13,258	17,463	6,654	25,929
St. Clair	313,859	41,363	--	--	2,914	101,224	14,148	27,726	1,351	125,133
St. Joseph	283,981	1,730	--	--	--	94,407	--	42,052	24,724	121,068
Sanilac	41,492	--	--	--	--	1,244	--	6,703	14,555	18,990
Shiawassee	250,082	--	--	--	--	92,834	7,722	45,559	10,594	93,373
Tuscola	178,462	6,152	--	4,461	--	20,276	17,186	49,535	32,672	48,180
Van Buren	293,169	13,485	--	--	--	86,559	24,205	43,387	2,022	123,511
Washtenaw	341,725	--	--	--	2,988	220,826	3,723	18,544	1,762	93,882
Wayne	166,096	--	--	--	--	101,604	1,663	9,602	957	52,270
Total	7,945,535	417,709	1,246	4,699	95,203	3,037,048	433,065	1,247,401	244,704	2,464,460
All units	47,669,136	5,797,977	2,847,012	2,648,562	2,651,968	6,625,625	6,997,862	4,813,225	5,303,404	9,983,501

1/ Species groups: other softwoods - primarily hemlock and tamarack; hard maple - sugar maple and black maple; soft maple - red maple and silver maple; other hardwoods - primarily hickory, yellow birch, beech, ash, balsam poplar, cottonwood, basswood, black walnut, black cherry, butternut, elm, and paper birch.

2/ International 1/4-inch rule.

Table 27.--Net volume of short-log trees on commercial forest land by species group and diameter class, Michigan, 1980

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS											
White pine	4,499	1,538	1,198	556	410	163	146	75	413	--	--
Red pine	696	370	224	--	--	102	--	--	--	--	--
Jack pine	3,797	2,289	504	622	194	188	--	--	--	--	--
White spruce	1,592	798	222	251	--	226	95	--	--	--	--
Black spruce	360	284	76	--	--	--	--	--	--	--	--
Balsam fir	2,743	1,153	1,088	199	--	303	--	--	--	--	--
Hemlock	12,079	3,549	2,349	1,966	1,083	1,178	722	581	530	121	--
Tamarack	515	395	60	--	60	--	--	--	--	--	--
Northern white-cedar	31,451	9,687	7,752	4,720	3,203	1,967	1,618	912	1,371	221	--
Other softwoods	382	227	155	--	--	--	--	--	--	--	--
Total	58,114	20,290	13,628	8,314	4,950	4,127	2,581	1,568	2,314	342	--
HARDWOODS											
Select white oaks	7,988	--	2,484	1,885	655	--	713	290	1,447	514	--
Select red oaks	16,310	--	4,577	2,945	1,617	1,991	1,693	1,543	1,211	733	--
Other red oaks	3,756	--	1,283	588	456	365	64	--	470	530	--
Hickory	1,155	--	172	283	250	202	--	248	--	--	--
Yellow birch	28,097	--	5,149	3,923	4,624	2,599	3,195	1,754	3,863	2,990	--
Hard maple	53,500	--	14,878	8,901	6,951	6,222	4,708	2,068	6,669	2,818	285
Soft maple	35,290	--	10,724	6,464	7,034	3,205	1,773	2,035	2,646	801	608
Beech	14,704	--	2,118	2,832	1,336	1,780	1,516	1,696	2,817	609	--
Ash	7,712	--	2,692	1,624	785	751	207	569	792	--	292
Balsam poplar	1,692	--	984	129	229	183	167	--	--	--	--
Cottonwood	92	--	--	--	--	--	--	92	--	--	--
Bigtooth aspen	8,057	--	3,096	1,983	1,281	761	369	319	248	--	--
Quaking aspen	21,989	--	8,781	5,393	4,223	1,899	959	639	95	--	--
Basswood	6,135	--	2,065	1,105	1,076	484	530	629	114	132	--
Yellow-poplar	--	--	--	--	--	--	--	--	--	--	--
Black walnut	288	--	--	--	--	--	--	--	--	288	--
Black cherry	6,054	--	3,077	1,012	1,017	674	274	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--
Elm	4,825	--	2,144	1,389	106	597	388	--	201	--	--
Paper birch	8,451	--	4,437	1,377	861	617	712	281	87	79	--
Other hardwoods	2,221	--	646	660	102	142	--	--	--	334	337
Total	228,316	--	69,307	42,493	32,603	22,472	17,268	12,163	20,660	9,828	1,522
All species	286,430	20,290	82,935	50,807	37,553	26,599	19,849	13,731	22,974	10,170	1,522

Table 28.--Net volume of short-log trees on commercial forest land by species group and diameter class, Michigan, 1980

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 22.9	23.0- 28.9	29.0- 38.9	39.0+
SOFTWOODS											
White pine	17,892	7,565	4,658	1,967	1,396	502	560	180	1,064	--	--
Red pine	2,871	1,631	938	--	--	302	--	--	--	--	--
Jack pine	16,843	11,455	1,988	2,229	753	418	--	--	--	--	--
White spruce	6,356	3,737	845	821	--	676	277	--	--	--	--
Black spruce	1,590	1,177	413	--	--	--	--	--	--	--	--
Balsam fir	10,037	4,819	3,989	700	--	529	--	--	--	--	--
Hemlock	44,323	15,008	9,187	6,997	3,426	3,659	2,749	1,664	1,374	259	--
Tamarack	2,409	1,921	302	--	186	--	--	--	--	--	--
Northern white-cedar	92,977	37,606	24,852	12,557	7,373	3,706	3,156	1,590	1,953	184	--
Other softwoods	2,188	1,321	867	--	--	--	--	--	--	--	--
Total	197,486	86,240	48,039	25,271	13,134	9,792	6,742	3,434	4,391	443	--
HARDWOODS											
Select white oaks	22,490	--	6,956	5,455	1,798	--	1,949	910	3,672	1,750	--
Select red oaks	46,701	--	13,910	8,407	4,561	5,331	4,932	4,370	3,483	1,707	--
Other red oaks	11,314	--	4,371	1,715	1,283	1,049	184	--	1,362	1,350	--
Hickory	3,635	--	1,062	797	282	791	--	703	--	--	--
Yellow birch	116,473	--	28,660	19,776	20,096	10,544	11,984	7,156	10,380	7,877	--
Hard maple	139,365	--	41,298	26,167	19,234	18,036	10,888	4,466	13,907	4,913	456
Soft maple	106,265	--	32,483	18,450	20,650	9,544	5,648	6,652	8,014	2,431	2,393
Beech	40,524	--	5,247	7,457	3,480	4,966	4,200	4,795	8,026	2,353	--
Ash	20,333	--	7,670	3,991	1,798	2,159	587	2,045	1,554	--	529
Balsam poplar	4,286	--	2,493	197	641	440	515	--	--	--	--
Cottonwood	337	--	--	--	--	--	--	337	--	--	--
Bigtooth aspen	19,855	--	8,633	4,629	2,963	1,784	732	671	443	--	--
Quaking aspen	58,989	--	24,893	14,478	10,695	4,768	2,751	1,251	153	--	--
Basswood	17,449	--	5,530	2,882	3,472	1,216	1,155	2,470	343	381	--
Yellow-poplar	--	--	--	--	--	--	--	--	--	--	--
Black walnut	246	--	--	--	--	--	--	--	--	246	--
Black cherry	16,980	--	9,377	2,392	2,494	1,905	812	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--
Elm	14,330	--	6,812	3,710	300	1,791	1,112	--	605	--	--
Paper birch	24,789	--	11,854	3,993	2,601	2,224	2,521	893	404	299	--
Other hardwoods	5,681	--	2,173	1,444	162	379	--	--	--	759	764
Total	670,042	--	213,422	125,940	96,510	66,927	49,970	36,719	52,346	24,066	4,142
All species	867,528	86,240	261,461	151,211	109,644	76,719	56,712	40,153	56,737	24,509	4,142

[1/] International 1/4-inch rule.

Table 29.--Net annual growth of growing stock on commercial forest land by softwoods and hardwoods, Michigan 1965 and 1979

(In million cubic feet)

Species	1/ 1965	1979
Softwoods	141.0	205.5
Hardwoods	363.7	472.3
All species	504.7	677.8

1/ Figures have been adjusted from those published after the 1966 survey to conform to 1979 volumes because of changes in survey definitions and procedures.

Table 30.--Net annual growth of growing stock on commercial forest land by species group and Forest Survey Unit, Michigan, 1979

(In thousand cubic feet)

Species group	All Units	Forest Survey Unit: Eastern Upper Peninsula	Western Upper Peninsula	Northern Lower Peninsula	Southern Lower Peninsula
SOFTWOODS					
White pine	19,345	4,426	4,794	7,359	2,766
Red pine	44,857	6,437	3,030	32,209	3,181
Jack pine	26,700	7,527	3,999	14,588	586
White spruce	23,053	7,252	12,811	2,483	507
Black spruce	12,587	6,570	4,936	1,081	--
Balsam fir	24,608	6,263	16,748	1,591	6
Hemlock	10,814	3,090	6,260	1,360	104
Tamarack	161	849	841	-1,568	39
Northern white-cedar	39,369	17,080	7,331	14,711	247
Other softwoods	3,977	51	86	2,584	1,256
Total	205,471	59,545	60,836	76,398	8,692
HARDWOODS					
Select white oaks	12,566	12	17	5,645	6,892
Select red oaks	33,886	816	2,599	21,281	9,190
Other red oaks	8,388	--	--	4,565	3,823
Hickory	2,871	--	--	50	2,821
Yellow birch	9,329	1,621	6,723	799	186
Hard maple	94,457	18,589	49,016	23,690	3,162
Soft maple	113,426	20,833	31,444	42,752	18,397
Beech	6,163	4,169	11	1,378	605
Ash	39,045	6,172	7,914	13,059	11,900
Balsam poplar	4,481	2,093	917	1,226	245
Cottonwood	2,500	15	6	322	2,157
Bigtooth aspen	36,330	1,956	2,295	28,441	3,638
Quaking aspen	52,163	10,834	15,664	20,759	4,906
Basswood	22,318	2,020	7,530	9,876	2,892
Yellow-poplar	400	--	--	--	400
Black walnut	796	--	--	3	793
Black cherry	16,830	1,989	2,109	5,876	6,856
Butternut	99	--	--	7	92
Elm	-12,374	-5,230	-1,291	-2,502	-3,351
Paper birch	25,532	6,791	8,873	9,155	713
Other hardwoods	3,080	10	8	267	2,795
Total	472,286	72,690	133,835	186,649	79,112
All species	677,757	132,235	194,671	263,047	87,804

Table 31.--Net annual growth of sawtimber on commercial forest land by species group and Forest Survey Unit, Michigan, 1979

(In thousand board feet)[1/]

Species group	All Units	Forest Survey Unit			
		Eastern Upper Peninsula	Western Upper Peninsula	Northern Lower Peninsula	Southern Lower Peninsula
SOFTWOODS					
White pine	108,617	25,973	25,759	39,030	17,855
Red pine	117,205	23,613	12,329	73,439	7,824
Jack pine	104,334	23,253	21,954	56,093	3,034
White spruce	95,051	33,520	53,710	7,748	73
Black spruce	10,896	5,452	5,499	-55	--
Balsam fir	66,895	15,119	44,394	7,348	34
Hemlock	63,350	19,709	37,543	5,597	501
Tamarack	5,070	3,203	3,722	-1,882	27
Northern white-cedar	105,695	40,382	32,141	32,964	208
Other softwoods	9,741	387	8	4,288	5,058
Total	686,854	190,611	237,059	224,570	34,614
HARDWOODS					
Select white oaks	68,022	22	104	25,985	41,911
Select red oaks	186,674	2,758	15,496	113,864	54,556
Other red oaks	36,495	--	--	17,573	18,922
Hickory	15,022	--	--	128	14,894
Yellow birch	32,273	8,178	19,639	3,846	610
Hard maple	288,837	65,882	139,326	69,970	13,659
Soft maple	301,091	55,522	79,450	109,124	56,995
Beech	24,013	18,805	8	2,969	2,231
Ash	109,978	12,098	31,615	38,964	27,301
Balsam poplar	25,884	8,986	4,484	10,606	1,808
Cottonwood	9,610	77	27	1,025	8,481
Bigtooth aspen	143,373	4,336	17,011	111,076	10,950
Quaking aspen	250,279	58,263	93,060	90,673	8,283
Basswood	95,669	8,150	29,144	50,875	7,500
Yellow-poplar	737	--	--	--	737
Black walnut	2,089	--	--	--	2,089
Black cherry	45,841	8,833	4,548	12,076	20,384
Butternut	156	--	--	43	113
Elm	-13,924	-12,244	1,630	-1,315	-1,995
Paper birch	65,409	17,076	28,787	19,022	524
Other hardwoods	9,990	13	16	2,273	7,688
Total	1,697,518	256,755	464,345	678,777	297,641
All species	2,384,372	447,366	701,404	903,347	332,255

[1/] International 1/4-inch rule.

Table 32.--Net annual growth of growing stock on commercial forest land by species group and ownership class, Michigan, 1979

(In thousand cubic feet)

Species group	All owners	Ownership class									
		National Forest	Bureau of Land Mgmt.	Misc. federal	Indian	State	County & municipal	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
SOFTWOODS											
White pine	19,345	2,077	--	28	--	5,165	156	1,829	2,063	2,516	5,511
Red pine	44,857	18,607	--	52	--	11,423	823	593	4,638	2,515	6,206
Jack pine	26,700	8,287	--	179	--	10,776	451	575	797	688	4,947
White spruce	23,053	4,308	--	103	99	3,770	214	5,095	1,934	2,772	4,758
Black spruce	12,587	2,709	--	1	6	3,790	115	2,183	704	828	2,251
Balsam fir	24,608	4,709	--	59	5	2,932	187	5,763	2,750	2,454	5,749
Hemlock	10,814	1,346	--	5	47	1,205	107	3,619	1,047	1,063	2,375
Tamarack	161	-97	--	--	2	937	76	251	-307	-387	-314
Northern white-cedar	39,369	2,516	--	6	8	11,191	164	6,717	6,972	2,799	8,996
Other softwoods	3,977	12	--	--	--	107	--	--	1,112	323	2,423
Total	205,471	44,474	--	433	167	51,296	2,293	26,625	21,710	15,571	42,902
HARDWOODS											
Select white oak	12,566	1,298	--	107	--	1,730	77	29	3,537	649	5,139
Select red oaks	33,886	897	--	7	5	8,042	437	976	6,341	3,480	13,701
Other red oaks	8,388	3,008	--	22	--	849	78	33	1,463	301	2,634
Hickory	2,871	--	--	--	--	215	26	--	1,680	35	915
Yellow birch	9,329	1,091	--	31	43	1,035	43	2,376	663	1,957	2,090
Hard maple	94,457	10,110	--	10	227	12,815	1,458	21,066	16,017	9,986	22,768
Soft maple	113,426	10,838	--	40	213	21,603	1,158	13,395	21,127	11,382	33,670
Beech	6,163	1,133	--	--	--	563	12	1,770	766	444	1,475
Ash	39,045	2,045	--	7	108	5,049	519	3,917	12,589	2,717	12,094
Balsam poplar	4,481	-150	--	--	1	1,185	3	526	1,220	234	1,462
Cottonwood	2,500	--	--	--	--	69	--	4	1,444	195	788
Bigtooth aspen	36,330	3,583	--	--	49	9,305	394	399	5,630	3,064	13,906
Quaking aspen	52,163	5,967	--	123	87	10,043	660	4,054	10,175	5,054	16,000
Basswood	22,318	1,970	--	--	10	3,994	197	2,058	6,207	1,987	5,895
Yellow-poplar	400	--	--	--	--	0	--	--	174	3	223
Black walnut	796	--	--	--	--	0	--	--	300	11	485
Black cherry	16,830	1,695	--	--	5	2,557	388	1,152	5,058	1,208	4,767
Butternut	99	--	--	--	--	0	8	--	53	7	31
Elm	-12,374	-177	--	--	-136	-2,556	-70	-1,004	-4,487	-510	-3,434
Paper birch	25,532	1,718	--	43	15	5,900	86	3,135	3,887	2,955	7,793
Other hardwoods	3,080	--	--	--	--	74	63	8	1,129	135	1,671
Total	472,286	45,026	--	390	627	82,472	5,537	53,894	94,973	45,294	144,073
All species	677,757	89,500	--	823	794	133,768	7,830	80,519	116,683	60,865	186,975

Table 33.--Net annual growth of sawtimber on commercial forest land by species group and ownership class, Michigan, 1979

(In thousand board feet)[1/]

Species group	All owners	Ownership class									
		National Forest	Bureau of Land Mgmt.	Misc. federal	Indian	State	County & municipal	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
SOFTWOODS											
White pine	108,617	11,804	--	--	--	29,836	1,165	9,132	10,381	13,287	33,012
Red pine	117,205	47,160	--	935	--	36,835	2,875	1,171	6,719	6,838	14,672
Jack pine	104,334	29,044	--	1,554	--	49,493	582	1,691	3,688	3,778	14,504
White spruce	95,051	26,481	--	647	52	18,249	822	14,041	7,884	13,621	13,254
Black spruce	10,896	1,057	--	--	--	5,387	470	4,370	371	-386	-373
Balsam fir	66,895	9,365	--	624	429	9,768	1,668	12,742	8,726	6,466	17,107
Hemlock	63,350	7,145	--	28	240	6,785	486	26,795	4,244	6,500	11,127
Tamarack	5,070	1,523	--	--	--	3,131	34	1,212	471	-2,042	741
Northern white-cedar	105,695	9,326	--	9	20	25,928	407	19,976	13,476	8,701	27,852
Other softwoods	9,741	19	--	--	--	--	--	--	3,346	945	5,431
Total	686,854	142,924	--	3,797	741	185,412	8,509	91,130	59,306	57,708	137,327
HARDWOODS											
Select white oaks	68,022	5,664	--	591	--	10,134	135	79	25,197	5,230	20,992
Select red oaks	186,674	3,704	--	--	30	42,038	2,675	7,321	42,921	17,237	70,748
Other red oaks	36,495	10,883	--	--	--	2,634	23	133	6,014	2,393	14,415
Hickory	15,022	--	--	--	--	1,582	26	--	8,671	57	4,686
Yellow birch	32,273	1,112	--	88	579	1,885	-104	12,463	6,075	5,095	5,080
Hard maple	288,837	25,511	--	36	775	30,795	2,332	72,061	53,872	26,723	76,732
Soft maple	301,091	26,668	--	219	215	50,111	1,660	41,894	55,854	23,892	100,578
Beech	24,013	3,026	--	--	--	823	39	7,766	3,214	3,742	5,403
Ash	109,978	8,405	--	--	48	12,287	3,395	10,266	26,057	9,021	40,499
Balsam poplar	25,884	438	--	--	5	6,559	--	3,408	3,065	3,355	9,054
Cottonwood	9,610	--	--	--	--	320	--	21	6,430	522	2,317
Bigtooth aspen	143,373	12,728	--	--	66	32,947	4,024	2,809	23,792	10,857	56,150
Quaking aspen	250,279	44,321	--	--	127	47,102	5,642	19,094	42,693	19,067	72,233
Basswood	95,669	8,475	--	--	69	20,943	796	9,466	19,484	9,666	26,770
Yellow-poplar	737	--	--	--	--	--	--	--	549	-5	193
Black walnut	2,089	--	--	--	--	--	--	--	380	--	1,709
Black cherry	45,841	5,869	--	--	--	6,039	31	4,590	16,258	1,141	11,913
Butternut	156	--	--	--	--	--	36	--	52	68	--
Elm	-13,924	1,015	--	--	-570	-3,765	-250	1,912	-5,746	-938	-5,582
Paper birch	65,409	8,341	--	32	--	14,858	49	7,933	11,723	6,091	16,382
Other hardwoods	9,990	--	--	--	--	856	1,476	36	3,242	330	4,050
Total	1,697,518	166,160	--	966	1,344	278,148	21,985	201,252	349,797	143,544	534,322
All species	2,384,372	309,084	--	4,763	2,085	463,560	30,494	292,382	409,103	201,252	671,649

[1/] International 1/4-inch rule.

Table 34.--Net annual growth of growing stock on commercial forest land by species group and forest type, Michigan, 1979

(In thousand cubic feet)

Species group	All types	Forest type: Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
SOFTWOODS								
White pine	19,345	449	1,257	5,735	898	204	533	807
Red pine	44,857	3,130	34,218	751	95	46	298	27
Jack pine	26,700	19,932	2,168	133	24	99	697	--
White spruce	23,053	31	396	723	5,366	3,878	218	932
Black spruce	12,587	310	43	70	1,102	41	8,974	551
Balsam fir	24,608	42	70	104	9,123	187	802	-4,549
Hemlock	10,814	--	134	44	209	3	58	278
Tamarack	161	3	7	11	90	5	429	-2,132
Northern white-cedar	39,369	5	24	212	1,421	276	850	24,934
Other softwoods	3,977	--	144	491	5	68	76	179
Total	205,471	23,902	38,461	8,274	18,333	4,807	12,935	21,027
HARDWOODS								
Select white oaks	12,566	53	209	58	--	--	--	--
Select red oaks	33,886	1,122	284	278	23	--	--	--
Other red oaks	8,388	421	199	--	--	--	--	--
Hickory	2,871	7	--	--	--	--	--	--
Yellow birch	9,329	--	--	10	163	6	15	403
Hard maple	94,457	4	86	148	173	41	26	238
Soft maple	113,426	289	473	883	1,749	186	460	1,521
Beech	6,163	--	3	8	6	1	--	--
Ash	39,045	--	-20	--	320	--	69	1,443
Balsam poplar	4,481	--	2	14	195	10	40	91
Cottonwood	2,500	--	--	--	--	--	--	--
Bigtooth aspen	36,330	119	648	196	-16	2	60	-70
Quaking aspen	52,163	482	721	370	1,171	408	888	601
Basswood	22,318	11	20	14	11	--	--	51
Yellow-poplar	400	--	23	--	--	--	--	--
Black walnut	796	--	3	--	--	--	--	--
Black cherry	16,830	20	117	404	130	61	20	20
Butternut	99	--	--	--	--	--	--	5
Elm	-12,374	-18	--	-9	-229	-19	--	-450
Paper birch	25,532	143	88	243	1,276	70	467	1,169
Other hardwoods	3,080	7	--	--	--	--	--	-7
Total	472,286	2,660	2,856	2,617	4,972	766	2,045	5,015
All species	677,757	26,562	41,317	10,891	23,305	5,573	14,980	26,042

(Table 34 continued on next page)

(Table 34 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
SOFTWOODS								
White pine	43	1,220	503	4,792	2,543	267	86	8
Red pine	7	1,957	91	1,330	2,382	124	374	27
Jack pine	110	1,933	--	457	940	90	20	97
White spruce	53	125	663	4,745	4,994	936	--	-7
Black spruce	285	3	235	17	721	231	--	4
Balsam fir	72	89	1,347	7,481	8,349	1,413	--	78
Hemlock	--	22	604	9,064	309	89	--	--
Tamarack	1,565	--	93	-24	104	4	--	6
Northern white-cedar	352	8	2,611	3,334	4,536	797	4	5
Other softwoods	--	67	27	364	9	--	2,547	--
Total	2,487	5,424	6,174	31,560	24,887	3,951	3,031	218
HARDWOODS								
Select white oaks	--	9,562	747	1,463	458	16	--	--
Select red oaks	--	21,380	369	5,819	4,341	194	73	3
Other red oaks	--	7,069	100	409	180	--	10	--
Hickory	--	1,698	89	1,056	17	4	--	--
Yellow birch	--	27	809	7,324	273	298	1	--
Hard maple	--	577	872	87,337	4,227	717	11	--
Soft maple	3	7,489	20,074	58,646	18,369	3,258	14	12
Beech	--	228	30	5,758	120	9	--	--
Ash	11	1,299	12,541	18,777	4,074	498	3	30
Balsam poplar	13	13	171	303	3,479	143	9	-2
Cottonwood	--	331	1,163	646	360	--	--	--
Bigtooth aspen	--	4,912	232	4,319	25,701	226	--	1
Quaking aspen	32	1,541	1,486	7,236	36,249	863	38	77
Basswood	--	568	871	19,843	749	139	14	27
Yellow-poplar	--	28	11	338	--	--	--	--
Black walnut	--	326	307	160	--	--	--	--
Black cherry	--	2,069	1,078	11,016	1,819	34	18	24
Butternut	--	23	14	57	--	--	--	--
Elm	--	-36	-2,905	-8,051	-805	148	-12	12
Paper birch	40	434	1,160	4,223	9,010	7,199	--	10
Other hardwoods	--	155	1,424	1,398	99	4	--	--
Total	99	59,693	40,643	228,077	108,720	13,750	179	194
All species	2,586	65,117	46,817	259,637	133,607	17,701	3,210	412

Table 35.--Net annual growth of sawtimber on commercial forest land by species group and forest type, Michigan, 1979

(In thousand board feet)[1/]

Species group	All types	Forest type: Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
SOFTWOODS								
White pine	108,617	1,888	6,531	31,975	6,478	918	2,692	4,936
Red pine	117,205	13,399	76,452	2,998	527	113	831	118
Jack pine	104,334	80,319	7,806	1,331	29	104	1,846	--
White spruce	95,051	121	196	2,504	31,365	6,842	543	2,631
Black spruce	10,896	11	86	492	3,964	532	5,523	13
Balsam fir	66,895	185	617	248	21,380	1,909	186	-11,515
Hemlock	63,350	--	49	959	1,369	21	272	1,797
Tamarack	5,070	--	43	49	1,244	-18	1,667	-1,987
Northern white-cedar	105,695	--	18	96	7,161	383	3,787	60,813
Other softwoods	9,741	--	1,040	1,092	--	1,450	--	--
Total	686,854	95,923	92,838	41,744	73,517	12,254	17,347	56,806
HARDWOODS								
Select white oaks	68,022	153	252	303	--	--	--	--
Select red oaks	186,674	5,063	1,795	1,900	--	--	--	--
Other red oaks	36,495	619	540	--	--	--	--	--
Hickory	15,022	1,365	--	--	--	--	--	--
Yellow birch	32,273	--	--	23	1,562	-1	34	1,876
Hard maple	288,837	--	267	120	245	33	30	573
Soft maple	301,091	80	528	360	8,022	--	120	4,015
Beech	24,013	--	24	--	--	10	--	--
Ash	109,978	--	-127	--	164	--	1,101	2,257
Balsam poplar	25,884	--	9	17	694	-41	23	494
Cottonwood	9,610	--	--	--	--	--	--	--
Bigtooth aspen	143,373	969	1,875	92	-155	13	595	-174
Quaking aspen	250,279	1,052	85	241	10,116	851	2,007	317
Basswood	95,669	21	60	--	38	--	--	205
Yellow-poplar	737	--	--	--	--	--	--	--
Black walnut	2,089	--	--	--	0	--	--	--
Black cherry	45,841	--	189	779	18	48	--	4
Butternut	156	--	--	--	--	--	--	9
Elm	-13,924	--	--	--	38	-137	--	-1,302
Paper birch	65,409	13	84	844	1,536	19	2,774	4,028
Other hardwoods	9,990	--	--	--	--	--	--	-28
Total	1,697,518	9,335	5,581	4,679	22,278	795	6,684	12,274
11 species	2,384,372	105,258	98,419	46,423	95,795	13,049	24,031	69,080

(Table 35 continued on next page)

[1/] International 1/4-inch

(Table 35 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
SOFTWOODS								
White pine	558	10,574	3,483	23,034	13,983	1,210	334	23
Red pine	36	7,094	223	2,940	11,819	471	107	77
Jack pine	82	5,572	--	853	5,447	812	77	56
White spruce	--	70	2,456	22,077	22,266	3,983	--	-3
Black spruce	142	--	477	-876	560	-46	--	18
Balsam fir	33	42	2,765	23,974	24,274	2,776	--	21
Hemlock	--	110	2,776	54,468	1,215	314	--	--
Tamarack	2,513	--	193	-17	1,303	29	--	51
Northern white-cedar	1,146	28	6,027	11,662	11,157	3,406	--	11
Other softwoods	--	370	--	2,908	6	--	2,875	--
Total	4,510	23,860	18,400	141,023	92,030	12,955	3,393	254
HARDWOODS								
Select white oaks	--	46,739	2,152	12,836	5,529	58	--	--
Select red oaks	--	112,314	1,351	41,782	20,613	1,797	37	22
Other red oaks	--	29,931	840	1,947	2,618	--	--	--
Hickory	--	10,244	362	2,958	62	31	--	--
Yellow birch	--	24	3,320	25,269	118	40	8	--
Hard maple	--	2,466	859	278,001	4,791	1,419	33	--
Soft maple	--	15,263	80,410	170,495	18,987	2,713	42	56
Beech	--	1,135	35	22,768	40	1	--	--
Ash	--	5,125	35,421	59,607	6,315	95	20	--
Balsam poplar	8	27	1,585	1,496	19,670	1,917	--	-15
Cottonwood	--	578	4,959	2,472	1,601	--	--	--
Bigtooth aspen	--	14,195	2,189	19,609	103,945	220	--	--
Quaking aspen	11	1,246	7,436	58,408	164,791	3,697	--	21
Basswood	--	466	4,847	84,494	3,922	1,390	--	226
Yellow-poplar	--	109	15	613	--	--	--	--
Black walnut	--	1,888	58	143	--	--	--	--
Black cherry	--	6,205	5,217	31,062	2,277	--	42	--
Butternut	--	17	36	94	--	--	--	--
Elm	--	301	-3,272	-8,816	-766	-22	--	52
Paper birch	6	1,364	5,431	12,730	15,804	20,776	--	--
Other hardwoods	--	297	7,054	930	854	883	--	--
Total	25	249,934	160,305	818,898	371,171	35,015	182	362
All species	4,535	273,794	178,705	959,921	463,201	47,970	3,575	616

Table 36.--Net annual growth of growing stock on commercial forest land by forest type and stand-age class, Michigan, 1979

(In thousand cubic feet)

Forest type	All classes	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	26,562	983	2,256	2,592	4,547	8,163	4,160	1,699	1,541	475	66	53	27	--
Red pine	41,317	679	4,554	17,375	9,804	4,478	531	1,296	612	704	378	855	51	--
White pine	10,891	71	303	808	129	1,588	873	1,567	1,426	1,398	1,122	590	626	390
Balsam fir	23,305	1,276	1,872	931	3,715	4,557	4,464	2,053	1,860	970	336	1,066	26	179
White spruce	5,573	282	774	32	2,031	729	675	106	233	289	0	479	--	-57
Black spruce	14,980	1,337	1,314	1,970	3,384	1,743	2,615	1,142	946	168	111	107	98	45
Northern white-cedar	26,042	453	1,221	1,615	2,238	1,823	2,987	4,239	3,365	2,945	1,548	2,140	926	542
Tamarack	2,586	207	185	312	51	319	665	452	127	29	134	80	--	25
Oak-hickory	65,117	3,049	2,234	632	4,202	9,055	13,149	7,000	7,561	6,020	3,810	6,871	1,403	131
Elm-ash-soft maple	46,817	2,649	3,116	3,167	5,041	6,215	5,926	5,162	3,543	3,950	1,902	4,008	1,373	765
Maple-birch	259,637	11,356	10,768	7,383	20,500	48,828	46,807	24,323	17,749	19,632	17,072	23,847	9,202	2,170
Aspen	133,607	14,737	15,115	5,554	18,922	26,872	24,612	11,974	7,745	3,686	2,479	1,643	268	--
Paper birch	17,701	689	492	503	1,373	2,718	6,080	3,367	1,071	388	644	103	234	39
Exotic	3,210	145	617	1,672	408	61	307	--	--	--	--	--	--	--
Nonstocked	412	150	83	22	23	36	86	--	--	12	--	--	--	--
All types	677,757	38,063	44,904	44,568	76,368	117,185	113,937	64,380	47,779	40,666	29,602	41,842	14,234	4,229

Table 37.--Net annual growth of sawtimber on commercial forest land by forest type and stand-age class, Michigan, 1979

(In thousand board feet)[1/]

Forest type	All classes	Stand-age class (years)												
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	105,258	2,533	3,046	4,584	23,656	27,595	20,694	11,645	8,884	1,321	1,083	159	58	--
Red pine	98,419	174	4,916	14,536	37,499	19,159	3,198	5,214	3,465	3,789	2,402	3,968	99	--
White pine	46,423	161	1,804	1,274	449	4,538	3,216	6,638	7,737	6,197	6,453	3,311	3,179	1,466
Balsam fir	95,795	2,777	5,952	3,270	10,548	22,302	14,097	9,287	15,353	5,812	1,833	3,076	1,178	310
White spruce	13,049	292	1,330	--	2,369	1,830	771	2,617	567	1,958	--	1,591	--	-276
Black spruce	24,031	1,904	3,440	4,018	2,678	2,367	2,298	3,908	329	--	866	1,061	1,329	-167
Northern white-cedar	69,080	1,927	817	2,090	2,201	3,571	7,276	9,375	4,902	7,615	3,974	11,913	6,343	7,076
Tamarack	4,535	1,013	292	1,174	60	67	294	291	192	35	491	493	--	133
Oak-hickory	273,794	9,783	7,670	1,483	12,366	26,009	41,917	30,107	42,232	36,883	14,164	42,435	8,031	714
Elm-ash-soft maple	178,705	12,179	6,464	6,078	14,275	16,329	28,668	17,888	16,138	22,249	6,995	23,456	4,646	3,340
Maple-birch	959,921	26,700	25,741	16,018	48,138	142,912	136,572	92,243	81,796	116,461	87,253	123,197	48,431	14,459
Aspen	463,201	30,464	19,764	11,285	46,804	91,423	98,728	69,701	42,476	22,899	17,346	11,187	1,124	--
Paper birch	47,970	2,830	522	23	1,898	5,772	18,752	8,069	3,078	1,165	4,601	911	278	71
Exotic	3,575	--	89	164	1,603	660	1,059	--	--	--	--	--	--	--
Nonstocked	616	8	304	--	--	172	82	--	--	50	--	--	--	--
All types	2,384,372	92,745	82,151	65,997	204,544	364,706	377,622	266,983	227,149	226,434	147,461	226,758	74,696	27,126

[1/] International 1/4-inch rule.

Table 38.--Net annual growth of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Michigan, 1979

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	5,762	--	--	99	153	447	738	1,303	1,088	648	505	781	--	--	--
Poletimber	16,587	--	62	259	455	943	1,316	1,552	2,154	1,369	2,650	2,914	2,868	--	45
Sapling & seedling	4,213	29	94	123	628	482	672	589	849	128	130	--	489	--	--
All stands	26,562	29	156	481	1,236	1,872	2,726	3,444	4,091	2,145	3,285	3,695	3,357	--	45
Red pine															
Sawtimber	7,350	--	13	--	288	247	46	429	728	539	455	989	2,008	1,116	492
Poletimber	29,843	--	--	--	88	390	766	1,252	2,558	2,124	1,548	4,615	5,731	6,441	4,330
Sapling & seedling	4,124	25	237	140	176	173	1,184	236	1,310	283	--	300	60	--	--
All stands	41,317	25	250	140	552	810	1,996	1,917	4,596	2,946	2,003	5,904	7,799	7,557	4,822
White pine															
Sawtimber	7,724	--	--	19	220	185	151	393	985	635	837	1,695	498	2,106	--
Poletimber	2,728	--	--	--	--	96	144	312	344	453	68	697	614	--	--
Sapling & seedling	439	11	23	70	33	95	54	153	--	--	--	--	--	--	--
All stands	10,891	11	23	89	253	376	349	858	1,329	1,088	905	2,392	1,112	2,106	--
Balsam fir															
Sawtimber	4,801	--	--	--	--	--	227	125	--	562	923	1,021	1,914	-84	113
Poletimber	14,610	--	--	29	47	392	188	1,215	1,172	971	1,818	4,013	2,798	1,431	536
Sapling & seedling	3,894	8	88	71	614	612	286	885	440	448	245	146	26	25	--
All stands	23,305	8	88	100	661	1,004	701	2,225	1,612	1,981	2,986	5,180	4,738	1,372	649
White spruce															
Sawtimber	1,027	--	--	--	38	62	--	66	87	68	93	205	221	151	36
Poletimber	3,458	--	--	--	--	35	--	419	276	439	184	172	1,696	129	108
Sapling & seedling	1,088	--	42	82	186	36	43	78	131	--	--	490	--	--	--
All stands	5,573	--	42	82	224	133	43	563	494	507	277	867	1,917	280	144
Black spruce															
Sawtimber	350	--	--	--	--	--	32	--	64	121	--	49	84	--	--
Poletimber	9,926	6	--	25	551	234	695	512	278	616	832	4,345	1,235	286	311
Sapling & seedling	4,704	10	286	43	443	634	480	987	193	183	855	403	187	--	--
All stands	14,980	16	286	68	994	868	1,207	1,499	535	920	1,687	4,797	1,506	286	311
Northern white-cedar															
Sawtimber	3,066	--	--	--	49	44	63	184	259	--	418	1,344	952	679	-926
Poletimber	18,456	--	--	--	172	20	266	293	451	383	959	2,215	5,457	3,991	4,249
Sapling & seedling	4,520	113	11	22	46	180	68	551	510	89	506	748	1,150	522	4
All stands	26,042	113	11	22	267	244	397	1,028	1,220	472	1,883	4,307	7,559	5,192	3,327

(Table 38 continued on next page)

(Table 38 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	333	--	--	19	3	25	--	--	202	--	--	--	84	--	--
Poletimber	1,297	--	--	--	179	137	120	171	222	222	127	119	--	--	--
Sapling & seedling	956	9	40	150	127	73	24	112	194	203	10	--	14	--	--
All stands	2,586	9	40	169	309	235	144	283	618	425	137	119	98	--	--
Oak-hickory															
Sawtimber	26,185	6	--	83	191	997	1,519	2,169	3,303	3,293	2,919	5,865	4,963	877	--
Poletimber	33,273	--	10	--	100	1,607	2,908	3,648	3,948	4,115	5,141	6,505	3,828	1,044	419
Sapling & seedling	5,659	37	430	229	1,344	1,491	1,065	894	45	20	51	53	--	--	--
All stands	65,117	43	440	312	1,635	4,095	5,492	6,711	7,296	7,428	8,111	12,423	8,791	1,921	419
Elm-ash-soft maple															
Sawtimber	17,670	--	--	69	305	672	629	1,095	2,516	1,349	855	3,390	4,503	1,771	516
Poletimber	22,204	--	217	109	690	1,803	237	2,217	2,730	1,033	5,562	2,779	2,712	1,799	316
Sapling & seedling	6,943	25	175	392	1,046	1,340	1,398	907	717	78	526	279	60	--	--
All stands	46,817	25	392	570	2,041	3,815	2,264	4,219	5,963	2,460	6,943	6,448	7,275	3,570	832
Maple-birch															
Sawtimber	95,744	--	42	--	287	885	1,081	4,456	8,295	6,205	13,175	23,046	26,271	9,716	2,285
Poletimber	138,076	--	51	197	1,540	1,624	2,134	8,565	12,301	10,652	17,980	33,007	37,011	12,504	510
Sapling & seedling	25,817	97	1,172	832	3,160	3,230	3,314	5,157	2,967	3,014	940	1,305	629	--	--
All stands	259,637	97	1,265	1,029	4,987	5,739	6,529	18,178	23,563	19,871	32,095	57,358	63,911	22,220	2,795
Aspen															
Sawtimber	22,463	--	124	17	348	817	645	1,424	2,525	1,765	2,748	3,531	5,269	2,299	951
Poletimber	79,037	--	56	131	1,807	3,495	4,346	7,481	8,403	7,528	11,903	12,521	13,790	6,256	1,320
Sapling & seedling	32,107	196	1,520	2,826	4,022	7,168	3,569	4,549	2,032	1,084	3,075	781	1,285	--	--
All stands	133,607	196	1,700	2,974	6,177	11,480	8,560	13,454	12,960	10,377	17,726	16,833	20,344	8,555	2,271
Paper birch															
Sawtimber	1,713	--	--	--	35	--	37	210	--	52	353	487	529	--	10
Poletimber	14,499	--	--	--	149	528	535	813	1,195	945	1,859	2,019	5,112	1,167	177
Sapling & seedling	1,489	4	8	45	225	263	54	165	130	127	325	143	--	--	--
All stands	17,701	4	8	45	409	791	626	1,188	1,325	1,124	2,537	2,649	5,641	1,167	187
Exotic															
Sawtimber	252	--	--	--	--	--	--	--	--	--	--	252	--	--	--
Poletimber	2,021	--	--	--	--	--	158	--	55	197	401	713	375	122	--
Sapling & seedling	937	--	20	202	114	13	--	66	344	--	165	--	13	--	--
All stands	3,210	--	20	202	114	13	158	66	399	197	566	965	388	122	--
Nonstocked	412	124	210	2	6	--	-2	24	48	--	--	--	--	--	--
All types															
Sawtimber	194,440	6	179	306	1,917	4,381	5,168	11,854	20,052	15,237	23,281	42,655	47,296	18,631	3,477
Poletimber	386,015	6	396	750	5,778	11,304	13,813	28,450	36,087	31,047	51,032	76,634	83,227	35,170	12,321
Sapling & seedling	96,890	564	4,146	5,227	12,164	15,790	12,211	15,329	9,862	5,657	6,828	4,648	3,913	547	4
Nonstocked	412	124	210	2	6	--	-2	24	48	--	--	--	--	--	--
All stands	677,757	700	4,931	6,285	19,865	31,475	31,190	55,657	66,049	51,941	81,141	123,937	134,436	54,348	15,802

Table 39.--Net annual growth of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Michigan, 1979

(In thousand board feet)[1/]

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	40,466	--	--	359	444	1,762	6,751	8,176	7,088	5,174	4,725	5,987	--	--	--
Poletimber	58,347	--	921	285	1,776	10,032	3,402	6,360	6,909	3,983	12,628	5,418	6,150	--	483
Sapling & seedling	6,445	59	233	102	1,514	2,301	387	982	802	65	--	--	--	--	--
All stands	105,258	59	1,154	746	3,734	14,095	10,540	15,518	14,799	9,222	17,353	11,405	6,150	--	483
Red pine															
Sawtimber	42,370	--	74	--	1,774	1,170	226	1,901	4,394	2,462	2,861	6,178	13,102	5,914	2,314
Poletimber	52,397	--	--	--	244	456	2,995	731	5,946	1,920	200	8,772	7,333	14,985	8,815
Sapling & seedling	3,652	136	19	639	--	96	2,182	248	--	332	--	--	--	--	--
All stands	98,419	136	93	639	2,018	1,722	5,403	2,880	10,340	4,714	3,061	14,950	20,435	20,899	11,129
White pine															
Sawtimber	38,288	--	--	410	525	1,023	331	2,084	4,325	3,780	4,461	8,116	1,959	11,274	--
Poletimber	5,925	--	--	--	--	409	273	113	426	963	124	2,838	779	--	--
Sapling & seedling	2,210	65	123	339	164	155	315	1,049	--	--	--	--	--	--	--
All stands	46,423	65	123	749	689	1,587	919	3,246	4,751	4,743	4,585	10,954	2,738	11,274	--
Balsam fir															
Sawtimber	31,986	--	--	--	--	--	1,215	172	--	3,274	2,838	13,983	8,562	496	1,446
Poletimber	52,031	--	--	33	84	591	101	5,913	4,259	1,461	5,584	12,439	12,617	6,636	2,313
Sapling & seedling	11,778	10	96	1,070	2,121	3,257	1,015	2,554	255	1,005	237	70	88	--	--
All stands	95,795	10	96	1,103	2,205	3,848	2,331	8,639	4,514	5,740	8,659	26,492	21,267	7,132	3,759
White spruce															
Sawtimber	4,699	--	--	--	108	288	--	288	283	131	88	641	1,270	401	1,201
Poletimber	6,730	--	--	--	--	65	--	73	660	1,609	462	1,005	1,189	1,556	111
Sapling & seedling	1,620	--	66	113	85	169	75	148	964	--	--	--	--	--	--
All stands	13,049	--	66	113	193	522	75	509	1,907	1,740	550	1,646	2,459	1,957	1,312
Black spruce															
Sawtimber	1,892	--	--	--	--	--	104	--	129	147	--	151	1,361	--	--
Poletimber	13,948	--	--	466	1,302	120	303	1,045	911	119	2,193	2,868	3,232	1,369	20
Sapling & seedling	8,191	-5	2,493	--	865	1,672	726	414	575	628	749	26	48	--	--
All stands	24,031	-5	2,493	466	2,167	1,792	1,133	1,459	1,615	894	2,942	3,045	4,641	1,369	20
Northern white-cedar															
Sawtimber	27,615	--	--	--	181	72	279	710	988	--	2,740	7,173	5,674	7,133	2,665
Poletimber	35,800	--	--	--	51	16	46	958	804	67	2,722	4,754	9,118	8,325	8,939
Sapling & seedling	5,665	837	29	55	27	425	19	1,023	586	578	370	1,159	240	300	17
All stands	69,080	837	29	55	259	513	344	2,691	2,378	645	5,832	13,086	15,032	15,758	11,621

(Table 39 continued on next page)

[1/] International 1/4-inch rule.

(Table 39 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	1,267	--	--	109	26	133	--	--	613	--	--	--	386	--	--
Poletimber	775	--	--	--	35	61	110	157	167	163	79	3	--	--	--
Sapling & seedling	2,493	--	912	101	759	--	68	139	5	95	--	--	414	--	--
All stands	4,535	--	912	210	820	194	178	296	785	258	79	3	800	--	--
Oak-hickory															
Sawtimber	148,569	32	--	1,008	1,168	4,111	9,901	9,290	16,249	25,003	14,860	26,583	35,205	5,159	--
Poletimber	107,659	--	16	--	25	2,726	6,941	11,816	15,109	12,218	13,753	26,883	13,186	3,785	1,201
Sapling & seedling	17,566	127	936	310	3,363	5,949	2,129	4,271	148	33	225	75	--	--	--
All stands	273,794	159	952	1,318	4,556	12,786	18,971	25,377	31,506	37,254	28,838	53,541	48,391	8,944	1,201
Elm-ash-soft maple															
Sawtimber	99,061	--	--	1,934	3,331	6,050	4,807	8,299	12,244	5,751	5,649	18,434	21,474	10,298	790
Poletimber	58,776	--	122	104	3,625	2,288	1,491	6,212	6,319	1,965	15,507	7,001	7,571	5,034	1,537
Sapling & seedling	20,868	323	234	891	2,642	5,585	5,605	572	2,806	-262	1,958	44	470	--	--
All stands	178,705	323	356	2,929	9,598	13,923	11,903	15,083	21,369	7,454	23,114	25,479	29,515	15,332	2,327
Maple-birch															
Sawtimber	515,311	--	567	--	1,063	5,858	4,832	17,499	41,168	25,704	76,718	123,977	148,737	59,345	9,843
Poletimber	385,353	--	15	198	1,283	5,113	6,816	20,755	25,108	26,250	44,898	90,005	116,914	45,942	2,056
Sapling & seedling	59,257	230	1,343	4,244	8,060	7,013	6,294	11,488	5,031	7,029	3,765	4,201	559	--	--
All stands	959,921	230	1,925	4,442	10,406	17,984	17,942	49,742	71,307	58,983	125,381	218,183	266,210	105,287	11,899
Aspen															
Sawtimber	152,662	--	73	82	913	5,636	3,731	14,467	20,232	12,379	18,594	20,441	35,641	11,664	8,809
Poletimber	254,157	--	8	599	4,304	4,940	6,623	25,061	21,220	27,303	35,520	44,724	53,987	18,033	11,835
Sapling & seedling	56,382	52	4,081	4,649	10,422	13,803	6,640	7,708	5,318	1,408	965	998	338	--	--
All stands	463,201	52	4,162	5,330	15,639	24,379	16,994	47,236	46,770	41,090	55,079	66,163	89,966	29,697	20,644
Paper birch															
Sawtimber	8,316	--	--	--	141	--	81	247	--	119	717	2,453	4,514	--	44
Poletimber	37,712	--	--	--	94	3,407	1,478	1,477	2,658	245	1,574	3,765	15,745	7,176	93
Sapling & seedling	1,942	29	--	82	43	285	153	1,188	61	93	--	8	--	--	--
All stands	47,970	29	--	82	278	3,692	1,712	2,912	2,719	457	2,291	6,226	20,259	7,176	137
Exotic															
Sawtimber	980	--	--	--	--	--	--	--	--	--	--	980	--	--	--
Poletimber	2,469	--	--	--	--	--	--	--	79	--	57	1,572	42	719	--
Sapling & seedling	126	--	--	--	--	--	--	--	80	--	46	--	--	--	--
All stands	3,575	--	--	--	--	--	--	--	159	--	103	2,552	42	719	--
Nonstocked	616	32	608	38	5	--	-41	--	-26	--	--	--	--	--	--
All types															
Sawtimber	1,113,482	32	714	3,902	9,674	26,103	32,258	63,133	107,713	83,924	134,251	235,097	277,885	111,684	27,112
Poletimber	1,072,079	--	1,082	1,685	12,823	30,224	30,579	80,671	90,575	78,266	135,301	212,047	247,863	113,560	37,403
Sapling & seedling	198,195	1,863	10,565	12,595	30,065	40,710	25,608	31,784	16,631	11,004	8,315	6,581	2,157	300	17
Nonstocked	616	32	608	38	5	--	-41	--	-26	--	--	--	--	--	--
All stands	2,384,372	1,927	12,969	18,220	52,567	97,037	88,404	175,588	214,893	173,194	277,867	453,725	527,905	225,544	64,532

Table 40.--Timber removals[1/] from growing stock on commercial forest land by species group and Forest Survey Unit, Michigan 1979

(In thousand cubic feet)

Species group	All Units	Forest Survey Unit			
		Eastern Upper Peninsula	Western Upper Peninsula	Northern Lower Peninsula	Southern Lower Peninsula
SOFTWOODS					
White pine	5,097	1,691	2,409	872	125
Red pine	7,798	1,422	1,945	3,105	1,326
Jack pine	16,192	5,230	2,889	7,999	74
White spruce	2,194	997	1,100	87	10
Black spruce	2,441	1,432	921	88	--
Balsam fir	8,931	4,273	3,816	842	--
Hemlock	6,633	2,554	3,868	185	26
Tamarack	772	151	79	438	104
Northern white-cedar	6,088	3,396	976	1,633	83
Other softwoods	221	--	--	--	221
Total	56,367	21,146	18,003	15,249	1,969
HARDWOODS					
Select white oaks	8,984	17	23	3,006	5,938
Select red oaks	20,599	151	1,417	11,720	7,311
Other red oaks	6,073	--	--	3,541	2,532
Hickory	647	--	--	15	632
Yellow birch	4,894	1,616	3,224	40	14
Hard maple	32,271	9,179	14,549	5,310	3,233
Soft maple	23,982	3,189	6,075	8,839	5,879
Beech	5,840	3,444	101	1,539	756
Ash	5,614	313	547	2,090	2,664
Balsam poplar	2,370	926	651	784	9
Cottonwood	1,291	--	--	454	837
Bigtooth aspen	31,390	1,509	3,792	25,206	883
Quaking aspen	51,805	8,658	22,510	20,023	614
Basswood	4,794	482	1,153	1,980	1,179
Black walnut	205	--	--	--	205
Elm	6,997	1,289	3,351	1,731	626
Paper birch	7,734	2,471	2,574	2,579	110
Other hardwoods[2/]	2,739	108	332	418	1,881
Total	218,229	33,352	60,299	89,275	35,303
All species	274,596	54,498	78,302	104,524	37,272

[1/] Removals in 1979 are trend-level removals.

[2/] Includes black cherry, butternut, and yellow-poplar.

Table 41.--Timber removals[1/] from sawtimber on commercial forest land by species group and Forest Survey Unit, Michigan, 1979

(In thousand board feet)[2/]

Species group	All Units	Forest Survey Unit			
		Eastern Upper Peninsula	Western Upper Peninsula	Northern Lower Peninsula	Southern Lower Peninsula
SOFTWOODS					
White pine	24,939	7,518	12,010	4,749	662
Red pine	27,365	5,571	7,770	10,636	3,388
Jack pine	40,291	11,894	7,680	20,583	134
White spruce	9,166	4,617	4,233	316	--
Black spruce	2,830	1,761	956	113	--
Balsam fir	23,301	10,525	9,512	3,264	--
Hemlock	23,663	9,043	13,748	805	67
Tamarack	766	426	147	185	8
Northern white-cedar	12,847	7,071	2,130	3,627	19
Other softwoods	25	--	--	--	25
Total	165,193	58,426	58,186	44,278	4,303
HARDWOODS					
Select white oaks	39,366	8	94	9,022	30,242
Select red oaks	79,627	611	4,832	38,084	36,100
Other red oaks	24,026	--	--	11,073	12,953
Hickory	3,229	--	--	93	3,136
Yellow birch	19,913	7,114	12,551	188	60
Hard maple	148,076	42,700	62,127	25,517	17,732
Soft maple	73,409	9,039	9,885	26,621	27,864
Beech	29,468	17,080	519	7,967	3,902
Ash	23,877	1,024	1,507	8,784	12,562
Balsam poplar	5,483	1,645	1,108	2,701	29
Cottonwood	6,535	--	--	2,332	4,203
Bigtooth aspen	80,876	2,868	11,389	63,600	3,019
Quaking aspen	143,925	18,022	60,776	63,275	1,852
Basswood	22,633	2,404	4,466	9,760	6,003
Black walnut	1,134	--	--	--	1,134
Elm	23,142	4,917	10,987	5,975	1,263
Paper birch	16,538	6,071	4,842	5,208	417
Other hardwoods[3/]	9,063	377	539	806	7,341
Total	750,320	113,880	185,622	281,006	169,812
All species	915,513	172,306	243,808	325,284	174,115

[1/] Removals in 1979 are trend-level removals.

[2/] International 1/4-inch rule.

[3/] Includes black cherry, butternut, and yellow-poplar.

Table 42.--Timber removals[1] from growing stock and sawtimber on commercial forest land by species group, Michigan, 1965 and 1979

Species group	Growing stock		Sawtimber	
	[2]1965	1979	[2]1965	1979
	Thousand cubic feet		Thousand board feet[3]	
SOFTWOODS				
White pine	2,972	5,097	15,757	24,939
Red pine	2,497	7,798	9,569	27,365
Jack pine	17,771	16,192	46,882	40,291
White spruce	2,847	2,194	14,292	9,166
Black spruce	3,450	2,441	8,015	2,830
Balsam fir	7,493	8,931	23,750	23,301
Hemlock	11,095	6,633	58,487	23,663
Tamarack	1,380	772	2,459	766
Northern white-cedar	9,284	6,088	12,814	12,847
Other softwoods	190	221	118	25
Total	58,979	56,367	192,143	165,193
HARDWOODS				
Select white oaks	6,293	8,984	29,566	39,366
Select red oaks	13,306	20,599	55,367	79,627
Other red oaks	3,679	6,073	13,956	24,026
Hickory	760	647	3,771	3,229
Yellow birch	7,569	4,894	42,335	19,913
Hard maple	27,305	32,271	142,103	148,076
Soft maple	12,585	23,982	47,954	73,409
Beech	5,550	5,840	32,126	29,468
Ash	3,538	5,614	14,284	23,877
Balsam poplar	1,297	2,370	7,208	5,483
Cottonwood	1,249	1,291	7,076	6,535
Bigtooth aspen	26,072	31,390	86,887	80,876
Quaking aspen	46,868	51,805	121,708	143,925
Basswood	3,685	4,794	20,305	22,633
Black walnut	382	205	2,364	1,134
Elm	11,859	6,997	65,595	23,142
Paper birch	4,873	7,734	14,735	16,538
Other hardwoods[4]	3,744	2,739	16,342	9,063
Total	180,614	218,229	723,682	750,320
All species	239,593	274,596	915,825	915,513

[1] Removals in 1979 are trend-level removals.

[2] Figures have been adjusted from those published after the 1966 survey to conform to 1979 volumes because of changes in survey definitions and procedures.

[3] International 1/4-inch rule.

[4] Includes black cherry.

Table 43.--Timber removals[1/] from growing stock and sawtimber on commercial forest land by item and species category, Michigan, 1979

Item	Growing stock						Sawtimber					
	All species	Pine	Other softwoods	Aspen	Hard maple	Other hardwoods	All species	Pine	Other softwoods	Aspen	Hard maple	Other hardwoods
	Thousand cubic feet						Thousand board feet[2/]					
ROUNDWOOD PRODUCTS												
Pulpwood	104,681	19,088	13,595	42,833	4,003	25,162	197,015	44,432	36,169	72,275	10,614	33,525
Saw logs	93,845	7,543	3,386	21,913	16,275	44,728	513,306	43,215	18,591	106,807	98,853	245,840
Fuelwood	8,324	16	23	553	1,617	6,115	27,425	103	96	1,816	5,311	20,099
Posts	2,602	--	2,591	--	--	11	2,740	--	2,674	--	--	66
Veneer logs	4,796	4	--	2,187	1,200	1,405	35,030	28	--	15,983	8,748	10,271
Poles	78	78	--	--	--	--	313	313	--	--	--	--
Other[3/]	8,722	229	605	6,569	30	1,289	15,648	715	1,971	11,265	193	1,504
Total	223,048	26,958	20,200	74,055	23,125	78,710	791,477	88,806	59,501	208,146	123,719	311,305
LOGGING RESIDUE	16,758	1,067	1,281	4,042	2,848	7,520	34,052	1,169	3,101	4,166	7,725	17,891
OTHER REMOVALS	34,790	1,062	5,799	5,098	6,298	16,533	89,984	2,620	9,996	12,489	16,632	48,247
ALL REMOVALS	274,596	29,087	27,280	83,195	32,271	102,763	915,513	92,595	72,598	224,801	148,076	377,443

[1/] Removals in 1979 are trend-level removals.

[2/] International 1/4-inch rule.

[3/] Includes charcoal wood, shingle bolts, cabin logs, particleboard bolts, piling, etc.

[4/] Less than 500 cubic feet.

Table 44.--Net annual growth and removals[1/] of growing stock on commercial forest land by species group, Michigan, 1979

(In thousand cubic feet)

Species group	Net annual growth	Annual timber removals
SOFTWOODS		
White pine	19,345	5,097
Red pine	44,857	7,798
Jack pine	26,700	16,192
White spruce	23,053	2,194
Black spruce	12,587	2,441
Balsam fir	24,608	8,931
Hemlock	10,814	6,633
Tamarack	161	772
Northern white-cedar	39,369	6,088
Other softwoods	3,977	221
Total	205,471	56,367
HARDWOODS		
Select white oaks	12,566	8,984
Select red oaks	33,886	20,599
Other red oaks	8,388	6,073
Hickory	2,871	647
Yellow birch	9,329	4,894
Hard maple	94,457	32,271
Soft maple	113,426	23,982
Beech	6,163	5,840
Ash	39,045	5,614
Balsam poplar	4,481	2,370
Cottonwood	2,500	1,291
Bigtooth aspen	36,330	31,390
Quaking aspen	52,163	51,805
Basswood	22,318	4,794
Black walnut	796	205
Elm	-12,374	6,997
Paper birch	25,532	7,734
Other hardwoods[2/]	20,409	2,739
Total	472,286	218,229
All species	677,757	274,596

[1/] Removals in 1979 are trend-level removals.

[2/] Includes black cherry, butternut, and yellow-poplar.

Table 45.--Net annual growth and removals[1/] of sawtimber on commercial forest land by species group, Michigan, 1979

(In thousand board feet)[2/]

Species group	Net annual growth	Annual timber removals
SOFTWOODS		
White pine	108,617	24,939
Red pine	117,205	27,365
Jack pine	104,334	40,291
White spruce	95,051	9,166
Black spruce	10,896	2,830
Balsam fir	66,895	23,301
Hemlock	63,350	23,663
Tamarack	5,070	766
Northern white-cedar	105,695	12,847
Other softwoods	9,741	25
Total	686,854	165,193
HARDWOODS		
Select white oaks	68,022	39,366
Select red oaks	186,674	79,627
Other red oaks	36,495	24,026
Hickory	15,022	3,229
Yellow birch	32,273	19,913
Hard maple	288,837	148,076
Soft maple	301,091	73,409
Beech	24,013	29,468
Ash	109,978	23,877
Balsam poplar	25,884	5,483
Cottonwood	9,610	6,535
Bigtooth aspen	143,373	80,876
Quaking aspen	250,279	143,925
Basswood	95,669	22,633
Black walnut	2,089	1,134
Elm	-13,924	23,142
Paper birch	65,409	16,538
Other hardwoods[3/]	56,724	9,063
Total	1,697,518	750,320
All species	2,384,372	915,513

[1/] Removals in 1979 are trend-level removals.

[2/] International 1/4-inch rule.

[3/] Includes black cherry, butternut, and yellow-poplar.

Table 46.--Net annual growth and removals[1/] of growing stock on commercial forest land by ownership class and softwoods and hardwoods, Michigan, 1979

(In thousand cubic feet)

Ownership class	Net annual growth			Annual timber removals		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National Forest	89,500	44,474	45,026	27,203	9,655	17,548
Bureau of Land Mgmt.	--	--	--	--	--	--
Miscellaneous federal	823	433	390	138	103	35
Indian	794	167	627	162	11	151
State	133,768	51,296	82,472	33,896	10,325	23,571
County and municipal	7,830	2,293	5,537	1,024	214	810
Forest industry	80,519	26,625	53,894	30,900	7,039	23,861
Farmer and other[2/]	364,523	80,183	284,340	181,273	29,020	152,253
All owners	677,757	205,471	472,286	274,596	56,367	218,229

[1/] Removals in 1979 are trend-level removals.

[2/] Includes miscellaneous private-corporation and miscellaneous private-indivdual.

Table 47.--Net annual growth and removals[1/] of sawtimber on commercial forest land by ownership class and softwoods and hardwoods, Michigan, 1979

(In thousand board feet)[2/]

Ownership class	Net annual growth			Annual timber removals		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National Forest	309,084	142,924	166,160	62,708	25,161	37,547
Bureau of Land Mgmt.	--	--	--	--	--	--
Miscellaneous federal	4,763	3,797	966	324	244	80
Indian	2,085	741	1,344	315	22	293
State	463,560	185,412	278,148	89,409	28,220	61,189
County and municipal	30,494	8,509	21,985	2,392	456	1,936
Forest industry	292,382	91,130	201,252	103,095	22,971	80,124
Farmer and other[3/]	1,282,004	254,341	1,027,663	657,270	88,119	569,151
All owners	2,384,372	686,854	1,697,518	915,513	165,193	750,320

[1/] Removals in 1979 are trend-level removals.

[2/] International 1/4-inch rule.

[3/] Includes miscellaneous private-corporation and miscellaneous private-individual.

Table 48.--Annual mortality of growing stock on commercial forest land by softwoods and hardwoods, Michigan, 1965 and 1979

(In million cubic feet)

Species	1/ 1965	1979
Softwoods	29.3	41.1
Hardwoods	80.3	117.1
Total	109.6	158.2

1/ Figures have been adjusted from those published after the 1966 survey to conform to 1979 volumes because of changes in survey definitions and procedures.

Table 49.--Annual mortality of growing stock on commercial forest land by species group and cause, Michigan, 1979

(In thousand cubic feet)

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
SOFTWOODS								
White pine	888	5	309	9	--	164	17	384
Red pine	72	--	38	--	--	2	7	25
Jack pine	2,430	55	388	--	80	137	31	1,739
White spruce	1,799	163	153	--	--	415	9	1,059
Black spruce	2,899	460	584	18	10	287	10	1,530
Balsam fir	23,959	3,496	4,125	--	55	3,710	69	12,504
Hemlock	636	12	141	--	--	59	3	421
Tamarack	4,515	108	761	86	142	60	--	3,358
Northern white-cedar	3,708	15	900	--	40	1,038	31	1,684
Other softwoods	179	--	--	--	--	--	--	179
Total	41,085	4,314	7,399	113	327	5,872	177	22,883
HARDWOODS								
Select white oaks	976	35	210	--	--	--	--	731
Select red oaks	5,237	137	633	--	1	177	68	4,221
Other red oaks	1,239	--	245	--	--	--	--	994
Hickory	147	--	--	--	--	39	--	108
Yellow birch	3,389	--	1,351	--	--	158	--	1,880
Hard maple	11,723	--	4,218	--	216	2,484	210	4,595
Soft maple	4,614	--	1,032	--	36	1,074	--	2,472
Beech	2,735	--	--	--	--	1,098	--	1,637
Ash	4,053	263	873	--	--	708	73	2,136
Balsam poplar	5,053	--	1,875	--	--	534	--	2,644
Cottonwood	149	--	30	--	--	1	26	92
Bigtooth aspen	12,045	--	6,060	--	--	941	95	4,949
Quaking aspen	32,447	43	15,076	--	506	4,798	69	11,955
Basswood	2,374	--	767	--	--	259	--	1,348
Yellow-poplar	46	--	--	--	--	--	--	46
Black walnut	101	--	--	--	--	--	--	101
Black cherry	489	--	32	--	--	59	--	398
Butternut	10	--	--	--	--	--	--	10
Elm	26,427	94	20,540	--	9	32	--	5,752
Paper birch	3,218	--	1,073	--	15	188	15	1,927
Other hardwoods	594	--	185	--	--	287	--	122
Total	117,066	572	54,200	--	783	12,837	556	48,118
All species	158,151	4,886	61,599	113	1,110	18,709	733	71,001

Table 50.--Annual mortality of sawtimber on commercial forest land by species group and cause, Michigan, 1979

(In thousand board feet)[1/]

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
SOFTWOODS								
White pine	3,714	25	1,291	--	--	732	--	1,666
Red pine	--	--	--	--	--	--	--	--
Jack pine	6,317	111	1,634	--	301	149	206	3,916
White spruce	6,842	765	735	--	--	2,008	--	3,334
Black spruce	6,901	1,669	2,067	--	--	138	104	2,923
Balsam fir	38,545	3,823	7,079	--	198	8,716	--	18,729
Hemlock	2,856	62	674	--	--	277	--	1,843
Tamarack	7,194	197	1,650	--	--	--	--	5,347
Northern white-cedar	8,312	61	2,130	--	44	1,999	--	4,078
Other softwoods	114	--	--	--	--	--	--	114
Total	80,795	6,713	17,260	--	543	14,019	310	41,950
HARDWOODS								
Select white oaks	1,455	--	1,432	--	--	1	--	22
Select red oaks	16,788	--	3,061	--	4	208	--	13,515
Other red oaks	3,087	--	1,146	--	--	--	--	1,941
Hickory	237	--	--	--	--	11	--	226
Yellow birch	12,783	--	5,077	--	--	1,090	--	6,616
Hard maple	28,195	--	11,686	--	--	6,426	--	10,083
Soft maple	9,222	--	1,694	--	--	2,392	--	5,136
Beech	9,820	--	2	--	--	4,412	--	5,406
Ash	7,743	--	3,172	--	--	3,081	--	1,490
Balsam poplar	16,604	--	6,484	--	--	2,569	--	7,551
Cottonwood	329	--	13	--	--	--	--	316
Bigtooth aspen	25,400	--	13,006	--	--	3,255	--	9,139
Quaking aspen	62,885	--	23,684	--	1,638	14,102	--	23,461
Basswood	6,205	--	2,651	--	--	796	--	2,758
Yellow-poplar	187	--	--	--	--	--	--	187
Black walnut	305	--	--	--	--	--	--	305
Black cherry	449	--	30	--	--	172	--	247
Butternut	28	--	--	--	--	--	--	28
Elm	52,701	193	39,570	--	--	29	--	12,909
Paper birch	4,013	--	1,584	--	--	681	--	1,748
Other hardwoods	915	--	422	--	--	491	--	2
Total	259,351	193	114,714	--	1,642	39,716	--	103,086
All species	340,146	6,906	131,974	--	2,185	53,735	310	145,036

[1/] International 1/4-inch rule.

Table 51.--Annual mortality of growing stock and sawtimber on commercial forest land by ownership class and softwoods and hardwoods, Michigan, 1979

Ownership class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwood
	Thousand cubic feet			Thousand board feet[1/]		
National Forest	18,939	5,597	13,342	39,090	12,741	26,34
Bureau of Land Management	--	--	--	--	--	--
Miscellaneous federal	361	48	313	679	106	57
Indian	220	36	184	770	89	68
State	31,065	10,760	20,305	62,254	19,631	42,62
County and municipal	1,392	241	1,151	2,686	469	2,21
Forest industry	18,666	6,596	12,070	46,882	12,756	34,12
Farmer	29,861	4,771	25,090	59,611	7,038	52,57
Misc. private-corp.	14,768	4,525	10,243	38,041	12,342	25,69
Misc. private-indiv.	42,879	8,511	34,368	90,133	15,623	74,51
All owners	158,151	41,085	117,066	340,146	80,795	259,35

[1/] International 1/4-inch rule.

Table 52.--Output of timber products by product, softwoods and hardwoods, and source of material, Michigan, 1978

Product	Standard units	Total		Roundwood products				Plant byproducts	
				Growing stock		Nongrowing stock			
		No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet
PULPWOOD									
Softwood	1/ Standard	480,169	37,891	414,188	32,683	48,804	3,851	17,177	1,357
Hardwood	cords	1,194,803	94,281	912,547	71,998	152,373	12,023	129,883	10,260
Total		1,674,972	132,172	1,326,735	104,681	201,177	15,874	147,060	11,617
SAW LOGS									
Softwood	2/ Thousand	65,120	11,290	63,042	10,929	2,078	361	--	--
Hardwood	board feet	498,203	85,709	481,987	82,916	16,216	2,793	--	--
Total		563,323	96,999	545,029	93,845	18,294	3,154	--	--
VENEER LOGS									
Softwood	2/ Thousand	28	4	28	4	--	--	--	--
Hardwood	board feet	35,002	4,792	35,002	4,792	--	--	--	--
Total		35,030	4,796	35,030	4,796	--	--	--	--
FUELWOOD									
Softwood	1/ Standard	23,398	1,583	717	39	2,601	138	20,080	1,406
Hardwood	cords	602,283	42,061	118,740	8,285	320,451	22,359	163,092	11,417
Total		625,681	43,644	119,457	8,324	323,052	22,497	183,172	12,823
POSTS									
Softwood	Thousand	2,777	2,846	2,528	2,591	249	255	--	--
Hardwood	pieces	7	11	7	11	--	--	--	--
Total		2,784	2,857	2,535	2,602	249	255	--	--
POLES									
Softwood	Pieces	9,196	78	9,196	78	--	--	--	--
Hardwood		--	--	--	--	--	--	--	--
Total		9,196	78	9,196	78	--	--	--	--
OTHER 3/									
Softwood	Thousand	1,300	1,300	834	834	52	52	414	414
Hardwood	cubic feet	20,894	20,894	7,888	7,888	1,007	1,007	11,999	11,999
Total		22,194	22,194	8,722	8,722	1,059	1,059	12,413	12,413
ALL PRODUCTS									
Softwood	Thousand	--	54,992	--	47,158	--	4,657	--	3,177
Hardwood	cubic feet	--	247,748	--	175,890	--	38,182	--	33,676
Total		--	302,740	--	223,048	--	42,839	--	36,853

1/ Rough-wood, 128 cubic foot basis.

2/ International 1/4-inch rule.

3/ Other (industrial production) includes cabin logs, charcoal wood, particleboard bolts, shingle bolts, pilings, etc.

Table 53.--Output of roundwood products by product, softwoods and hardwoods, and source of material, Michigan, 1978

(In thousand cubic feet)

Product and species group	All sources	Growing-stock trees			Rough and rotten trees	Salvable dead trees	Other sources
		Total	Sawtimber	Poletimber			
INDUSTRIAL PRODUCTS							
Saw logs							
Softwood	11,290	10,929	10,762	167	6	139	216
Hardwood	85,709	82,916	77,663	5,253	806	361	1,626
Subtotal	96,999	93,845	88,425	5,420	812	500	1,842
Veneer logs and bolts							
Softwood	4	4	4	--	--	--	--
Hardwood	4,792	4,792	4,792	--	--	--	--
Subtotal	4,796	4,796	4,796	--	--	--	--
Pulpwood							
Softwood	36,534	32,683	20,847	11,836	703	943	2,205
Hardwood	84,021	71,998	29,938	42,060	5,873	957	5,193
Subtotal	120,555	104,681	50,785	53,896	6,576	1,900	7,398
Cooperage							
Softwood	--	--	--	--	--	--	--
Hardwood	--	--	--	--	--	--	--
Subtotal	--	--	--	--	--	--	--
Piling							
Softwood	9	9	9	--	--	--	--
Hardwood	--	--	--	--	--	--	--
Subtotal	9	9	9	--	--	--	--
Poles							
Softwood	78	78	64	14	--	--	--
Hardwood	--	--	--	--	--	--	--
Subtotal	78	78	64	14	--	--	--
Mine timbers (Round)							
Softwood	14	11	9	2	--	3	--
Hardwood	30	30	30	--	--	--	--
Subtotal	44	41	39	2	--	3	--
Posts (Round and split)							
Softwood	2,846	2,591	687	1,904	30	--	225
Hardwood	11	11	11	--	--	--	--
Subtotal	2,857	2,602	698	1,904	30	--	225
Other							
Softwood	863	814	497	317	--	7	42
Hardwood	8,865	7,858	3,135	4,723	288	87	632
Subtotal	9,728	8,672	3,632	5,040	288	94	674
All industrial products							
Softwood	51,638	47,119	32,879	14,240	739	1,092	2,688
Hardwood	183,428	167,605	115,569	52,036	6,967	1,405	7,451
Total	235,066	214,724	148,448	66,276	7,706	2,497	10,139
FUELWOOD							
Softwood	177	39	24	15	5	2	131
Hardwood	30,644	8,285	4,817	3,468	1,735	143	20,481
Total	30,821	8,324	4,841	3,483	1,740	145	20,612
ALL PRODUCTS							

Table 54.--Timber products from roundwood by species group and product, Michigan, 1978

Species group	All products	Pulpwood		Saw logs		Veneer logs	
	Thousand cubic feet	Cords	Thousand cubic feet	Thousand board feet[1/]	Thousand cubic feet	Thousand board feet[1/]	Thousand cubic feet
SOFTWOODS							
White pine	4,611	10,836	850	22,276	3,726	1	--
Red pine	8,175	74,037	5,842	13,231	2,205	27	4
Jack pine	17,288	192,007	15,167	9,821	1,840	--	--
White spruce	1,865	20,603	1,623	886	163	--	--
Black spruce	1,981	21,892	1,726	884	163	--	--
Balsam fir	8,126	87,342	6,893	3,396	641	--	--
Hemlock	5,346	48,413	3,822	8,907	1,493	--	--
Tamarack	176	1,750	133	221	42	--	--
Northern white-cedar	4,247	6,112	478	5,498	1,017	--	--
Other softwoods	--	--	--	--	--	--	--
Total	51,815	462,992	36,534	65,120	11,290	28	4
HARDWOODS							
Select white oaks	8,912	18,773	1,463	29,105	5,096	615	84
Select red oaks	24,248	77,059	6,077	77,635	13,622	2,205	302
Other red oaks	4,516	8,182	645	15,860	2,784	411	56
Hickory	712	--	--	1,435	232	43	4
Yellow birch	3,664	22,395	1,766	8,087	1,357	2,839	389
Hard maple	30,547	82,203	6,486	104,075	16,843	8,748	1,200
Soft maple	21,097	120,135	9,478	47,465	8,321	594	80
Beech	4,690	10,587	832	17,987	3,008	1,148	158
Ash	5,629	11,072	865	18,664	3,253	178	24
Balsam poplar	2,308	25,297	1,994	1,450	252	--	--
Cottonwood	1,182	--	--	5,848	1,018	226	31
Bigtooth aspen	28,263	181,505	14,336	52,115	9,158	2,468	338
Quaking aspen	51,846	404,103	31,919	74,963	13,177	13,515	1,849
Basswood	3,852	4,276	336	19,364	3,379	521	74
Black walnut	236	--	--	855	139	173	22
Elm	9,083	25,975	2,053	12,481	2,186	241	33
Paper birch	8,352	67,324	5,304	6,646	1,164	1,004	138
Other hardwoods[2/]	4,935	6,034	467	4,168	720	73	10
Total	214,072	1,064,920	84,021	498,203	85,709	35,002	4,792
All species	265,887	1,527,912	120,555	563,323	96,999	35,030	4,796

(Table 54 continued on next page)

[1/] International 1/4-inch rule.

[2/] Includes black cherry, butternut, and yellow-poplar.

(Table 54 continued)

Species group	Fuelwood		Posts		Poles		Other products
	Cords	Thousand cubic feet	Thousand pieces	Thousand cubic feet	Pieces	Thousand cubic feet	Thousand cubic feet
SOFTWOODS							
White pine	644	35	--	--	--	--	--
Red pine	313	10	--	--	8,606	73	41
Jack pine	753	39	--	--	590	5	237
White spruce	19	--	61	61	--	--	18
Black spruce	24	1	73	73	--	--	18
Balsam fir	49	1	542	555	--	--	36
Hemlock	530	31	--	--	--	--	--
Tamarack	52	1	--	--	--	--	--
Northern white-cedar	934	59	2,101	2,157	--	--	536
Other softwoods	--	--	--	--	--	--	--
Total	3,318	177	2,777	2,846	9,196	78	886
HARDWOODS							
Select white oaks	32,416	2,267	--	--	--	--	2
Select red oaks	55,899	3,896	--	--	--	--	351
Other red oaks	14,185	991	--	--	--	--	40
Hickory	6,858	476	--	--	--	--	--
Yellow birch	2,235	152	--	--	--	--	--
Hard maple	85,682	5,988	--	--	--	--	30
Soft maple	37,016	2,586	--	--	--	--	632
Beech	9,887	689	--	--	--	--	3
Ash	21,333	1,487	--	--	--	--	--
Balsam poplar	884	62	--	--	--	--	--
Cottonwood	1,903	133	--	--	--	--	--
Bigtooth aspen	14,041	979	--	--	--	--	3,452
Quaking aspen	15,228	1,064	--	--	--	--	3,837
Basswood	968	63	--	--	--	--	--
Black walnut	1,074	75	--	--	--	--	--
Elm	68,873	4,811	--	--	--	--	--
Paper birch	17,269	1,198	--	--	--	--	548
Other hardwoods	53,440	3,727	7	11	--	--	--
Total	439,191	30,644	7	11	--	--	8,895
All species	442,509	30,821	2,784	2,857	9,196	78	9,781

Table 55.--Volume of primary plant residue by use and type of residue, Michigan, 1978

(In thousand cubic feet)

se	Wood residue							
	Total		Coarse[1/]		Fine[2/]		Bark[3/]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Fiber products[4/]	1,194.8	14,899.7	1,147.9	14,584.1	46.9	315.6	30.5	579.9
Charcoal	--	--	--	--	--	--	--	3.0
Industrial fuel	702.7	4,478.6	167.7	767.7	535.0	3,710.9	696.8	3,650.4
Domestic fuel	701.7	6,937.4	699.9	6,859.5	1.8	77.9	232.5	3,596.3
Miscellaneous[5/]	414.4	7,358.8	19.8	406.6	394.6	6,952.2	186.5	3,941.3
Not used[6/]	773.2	5,323.9	356.2	1,303.0	417.0	4,020.9	613.6	3,957.6
otal	3,786.8	38,998.4	2,391.5	23,920.9	1,395.3	15,077.5	1,759.9	15,728.5

[1/] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2/] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3/] Does not include bark disposal at pulpmills.

[4/] For manufacture of pulp, hardboard, or roofing felt.

[5/] Livestock bedding, mulch, small dimension, and specialty items.

[6/] Includes residue burned as waste.

Table 56.--All live shrub[1/] biomass yields on commercial forest land by shrub species group and forest type, Michigan, 1980

(In pounds per acre)

Shrub species group	Forest type														
	Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
TALL SHRUBS															
Balsam fir	4	27	125	587	66	181	317	145	10	72	71	125	285	--	--
Tamarack	--	--	--	14	13	10	8	81	--	2	--	1	15	--	--
White spruce	--	--	--	48	43	--	13	--	2	4	4	5	35	--	--
Black spruce	17	7	3	71	--	476	46	167	--	4	--	2	1	--	--
Jack pine	199	6	--	--	--	--	--	--	26	--	--	3	--	--	4
Red pine	8	27	--	--	--	--	--	--	3	--	1	--	--	--	--
White pine	13	22	122	7	--	1	--	6	34	--	2	6	14	--	--
Scotch pine	--	--	--	--	--	--	--	--	--	--	--	--	--	94	--
Northern white-cedar	--	--	--	306	7	9	315	22	--	15	16	15	27	--	--
Hemlock	--	--	--	8	--	--	--	--	--	5	11	--	1	--	--
Boxelder	--	--	--	--	--	--	--	--	--	2	--	--	--	--	--
Striped maple	--	--	--	--	--	--	--	--	--	--	5	1	3	--	--
Red maple	11	48	55	37	153	29	56	29	85	109	102	143	53	3	--
Silver maple	--	--	--	--	--	--	--	--	1	10	--	3	--	--	--
Sugar maple	--	15	68	29	55	52	9	--	8	25	480	39	22	--	--
Mountain maple	--	--	--	103	86	--	32	2	--	76	32	21	145	--	--
Red alder	--	--	7	--	--	--	--	--	--	--	--	3	--	--	--
Green alder	34	--	--	--	--	40	--	--	3	--	--	1	44	--	--
Speckled alder	71	24	118	644	260	1,703	433	2,607	13	607	35	134	283	--	369
Yellow birch	--	--	--	5	--	--	--	--	--	5	15	3	--	16	--
Paper birch	1	--	1	10	31	--	6	--	--	8	6	7	12	--	--
Swamp birch	--	--	--	--	--	11	--	--	--	--	--	--	--	--	--
American hornbeam	--	30	--	--	--	--	--	--	5	11	6	1	1	--	--
Dogwood	1	1	93	68	15	49	110	38	45	219	27	126	200	1	36
Flowering dogwood	--	--	--	--	--	3	--	--	4	--	1	--	--	--	--
Hawthorn	6	21	--	--	--	--	--	--	8	3	2	3	--	--	46
Beech	--	6	--	--	--	--	--	--	1	2	24	2	--	--	--
White ash	--	2	--	--	1	--	--	--	22	21	20	25	16	1	--
Black ash	--	--	--	28	1	--	96	1	--	155	9	21	7	--	--
Green ash	--	--	--	--	--	--	10	--	1	45	4	11	2	--	--
Black alder	--	--	--	--	--	--	53	8	--	32	3	1	--	--	--
Mountain holly	--	--	--	--	--	4	--	--	--	16	--	--	1	--	--
Spice bush	--	--	--	--	--	--	--	--	--	26	8	--	--	--	--
Apple	--	--	--	--	--	--	--	--	3	--	1	--	--	--	--
Eastern hophornbeam	--	--	8	--	--	--	--	--	14	--	45	21	1	21	--
Balsam poplar	--	--	--	31	18	--	20	--	--	6	1	18	10	--	--
Bigtooth aspen	1	10	--	--	--	--	--	--	7	--	2	62	53	17	--
Quaking aspen	4	27	1	3	--	4	7	5	7	21	27	213	53	20	--
Pincherry	12	--	--	--	8	--	--	--	5	1	1	3	--	--	1
Black cherry	27	36	30	21	16	8	2	--	149	66	51	68	18	40	1
Chokecherry	6	2	5	5	83	6	4	17	13	17	9	32	7	4	1
Sandcherry	1	--	--	--	--	--	--	--	--	--	--	--	--	--	16
Pawpaw	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--
White oak	6	1	13	--	--	--	--	--	67	1	4	5	--	1	--
Northern pin oak	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--
Northern red oak	62	35	4	--	--	--	--	--	164	4	13	32	13	12	2
Black oak	8	--	--	--	--	--	--	--	25	--	--	2	--	--	--
Sweet gale	--	--	--	34	--	--	4	--	--	22	--	--	--	--	--

(Table 56 continued on next page)

Shrub species group	Forest type														
	Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Mountain ash	--	--	--	--	--	6	9	--	--	2	2	2	--	--	--
Witch hazel	--	--	18	10	7	11	--	--	38	11	11	45	12	--	--
Juneberry	25	11	109	25	82	12	18	391	18	18	16	49	38	1	7
Hazel	--	20	106	88	111	--	162	45	21	86	113	115	48	--	--
Prickly ash	--	--	--	--	--	--	--	--	64	12	3	--	--	--	--
Alder buckthorn	--	--	--	--	--	--	4	--	--	3	--	--	--	--	--
Leatherwood	--	--	--	--	--	--	--	--	--	--	2	1	--	--	--
Viburnum	34	27	--	239	--	98	47	137	189	192	21	99	56	--	--
Elder	--	6	--	--	--	--	2	--	2	18	11	2	--	--	1
Sumac	--	38	--	--	--	--	1	--	10	7	7	18	--	4	4
Buffaloberry	--	--	--	3	--	--	--	--	--	--	--	1	--	--	--
Buttonbush	--	--	--	2	--	--	--	--	--	--	--	--	--	--	--
Willow	57	23	1	105	246	4	43	408	1	89	9	61	69	41	20
Sassafras	--	2	--	--	--	--	--	--	32	1	6	2	--	--	--
American basswood	--	--	--	--	--	--	--	--	1	4	10	2	1	--	--
American elm	12	--	--	2	--	--	--	--	4	56	15	4	78	1	--
Slippery elm	--	--	--	--	--	--	--	--	6	2	1	--	--	--	--
Rock elm	--	--	--	--	--	--	--	--	6	11	--	--	--	--	--
Total	620	474	887	2,534	1,302	2,717	1,827	4,109	1,117	2,124	1,266	1,559	1,624	277	508
LOW SHRUBS															
Common juniper	--	--	10	--	--	--	--	--	--	--	--	--	--	--	--
Yew	--	--	--	4	1	1	2	2	--	--	3	--	--	--	--
Holly	--	--	--	--	--	--	2	--	--	1	--	--	--	--	--
Virginia creeper	--	--	--	--	--	--	--	--	--	1	--	--	1	--	--
Spirea	--	--	--	--	--	--	--	2	--	7	--	--	1	--	1
Labrador tea	13	--	23	41	12	218	9	15	--	41	--	--	--	--	--
Leatherleaf	50	--	151	67	--	158	1	321	9	19	--	17	66	--	--
Bog laurel	2	--	--	--	--	6	1	1	--	1	--	--	--	--	--
Sweetfern	48	13	1	--	5	1	--	1	18	--	2	6	--	5	7
Gooseberry-currant	--	--	--	4	--	--	2	3	1	8	--	2	1	--	26
Chokeberry	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--
Raspberry-blackberry	8	31	38	26	5	9	9	29	25	22	29	39	42	102	69
Rose	--	--	--	2	--	1	--	--	2	2	1	--	--	--	--
Black huckleberry	4	--	--	--	--	--	--	--	2	--	--	--	--	--	--
Bilberry-blueberry	459	157	56	32	13	130	11	41	133	10	11	38	12	--	35
Bush honeysuckle	--	4	4	3	6	--	--	3	1	1	--	2	2	--	--
Honeysuckle	--	7	1	15	8	3	5	4	3	3	5	7	4	--	--
Snowberry	--	--	--	2	1	--	--	--	--	--	--	--	--	--	--
Shrubby cinquefoil	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--
St. John's wort	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bearberry	7	1	--	--	--	2	1	--	--	1	--	--	--	--	--
Greenbriar	--	--	--	--	--	--	--	--	4	--	--	--	--	--	--
Bog rosemary	--	--	--	--	--	4	--	2	--	--	--	1	--	--	--
Grape	--	--	--	--	--	--	--	--	--	3	--	--	1	--	--
Total	591	213	284	196	51	533	44	424	198	120	51	112	131	107	139
All shrubs	1,211	687	1,171	2,730	1,353	3,250	1,871	4,533	1,315	2,244	1,317	1,671	1,755	384	647
Number of plots[2/]	188	107	62	90	101	115	246	28	435	325	1,883	916	108	30	37

[1/] Trees under 1.0-inch d.b.h. are also included. Low shrub species that averaged less than 1.0 pound per acre are not included.

[2/] Number of plots by forest type from which average yields were derived.

Table 57.--All live tree biomass yields on commercial forest land by species group and forest type, Michigan, 1980

(In pounds per acre)

Species group	Forest type														
	Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
SOFTWOODS															
White pine	1,355	3,798	58,275	3,116	4,760	2,544	2,172	1,000	1,497	952	1,515	1,316	1,487	1,330	436
Red pine	6,001	72,119	9,585	526	1,367	1,079	120	141	1,654	152	335	1,279	1,018	6,407	297
Jack pine	60,033	9,261	2,017	155	901	3,562	--	419	2,587	21	221	787	702	1,465	403
White spruce	45	333	2,908	12,051	40,173	745	2,261	47	74	733	928	1,465	2,421	410	11
Black spruce	1,265	314	2,471	4,486	2,074	36,702	6,103	6,460	19	403	151	402	653	--	385
Balsam fir	107	652	6,782	41,314	12,220	6,344	15,197	3,692	121	3,849	3,581	5,868	10,739	--	145
Hemlock	--	210	982	1,517	157	430	1,271	--	60	1,638	6,963	370	1,105	--	4
Tamarack	19	34	242	963	543	3,707	3,949	42,978	4	449	36	175	522	--	224
Northern white-cedar	8	169	1,045	8,044	8,755	5,381	68,426	5,480	15	4,565	1,669	2,432	6,684	62	72
Other softwoods	--	540	3,333	10	2,918	11	155	--	111	34	201	37	--	68,786	35
Total	68,833	87,430	87,640	72,182	73,868	60,505	99,654	60,217	6,142	12,796	15,600	14,131	25,331	78,460	2,012
HARDWOODS															
Select white oaks	408	1,547	2,260	--	--	--	--	--	29,727	2,164	1,290	873	256	570	--
Select red oaks	4,906	2,752	4,286	84	--	--	--	--	46,814	1,068	4,031	4,301	2,590	2,032	92
Other red oaks	1,864	2,220	--	--	--	--	--	--	15,920	309	282	281	--	595	--
Hickory	39	87	--	--	--	--	--	--	4,356	284	759	16	47	--	--
Yellow birch	--	--	287	2,877	412	496	1,815	--	81	3,086	8,834	380	1,067	137	--
Hard maple	81	667	2,409	1,767	1,639	179	573	--	1,096	1,944	52,558	2,917	6,220	1,399	358
Soft maple	1,092	2,260	6,761	8,384	3,933	2,028	4,758	853	8,563	35,934	21,587	9,520	12,829	383	316
Beech	--	81	449	44	287	--	--	--	272	254	6,375	275	489	--	15
Ash	--	106	217	1,517	145	394	4,491	307	1,730	22,512	6,033	1,942	2,562	88	408
Balsam poplar	--	11	145	1,757	2,091	347	2,131	629	25	1,101	244	4,059	1,444	1,316	132
Cottonwood	--	--	--	--	--	--	--	--	308	2,342	309	274	--	--	--
Bigtooth aspen	576	1,970	1,576	359	163	288	374	--	5,788	537	2,386	16,310	2,945	1,324	203
Quaking aspen	1,857	3,549	6,956	9,619	17,267	4,752	2,643	1,286	1,731	4,226	5,224	32,421	9,503	3,857	556
Basswood	55	82	69	47	68	--	142	--	511	1,722	8,003	582	1,221	364	--
Yellow-poplar	--	35	--	--	--	--	--	--	98	99	175	--	--	--	--
Black walnut	--	30	--	--	--	--	--	--	1,106	232	91	--	--	--	--
Black cherry	214	711	781	880	1,225	124	68	--	2,750	1,491	3,908	1,227	425	1,375	1,300
Butternut	39	--	--	--	--	--	25	--	122	107	26	--	--	--	--
Elm	36	--	139	876	390	75	278	--	560	5,856	3,864	816	393	124	548
Paper birch	464	808	7,164	8,098	3,251	2,959	9,226	1,631	855	2,967	2,566	6,382	56,478	--	261
Other hardwoods	19	73	--	1	203	--	38	--	1,181	3,236	985	149	52	775	--
Noncommercial species	26	102	11	134	21	258	162	--	820	1,107	2,310	524	773	168	688
Total	11,676	17,091	33,510	36,444	31,095	11,900	26,724	4,706	124,414	92,578	131,840	83,249	99,294	14,507	4,877
All species	80,509	104,521	121,150	108,626	104,963	72,405	126,378	64,923	130,556	105,374	147,440	97,380	124,625	92,967	6,889
Number of plots[1/]	346	226	102	336	52	244	651	64	616	563	2,928	1,529	190	37	89

[1/] Number of plots by forest type from which average yields were derived.

Table 58.--All live tree biomass on commercial forest land by species group and forest type, Michigan, 1980

(In thousand green tons)

Species group	All types	Forest type							
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar	Tamarack
SOFTWOODS									
White pine	20,468	567	1,246	6,238	990	238	662	1,275	57
Red pine	33,042	2,511	23,651	1,026	167	68	281	70	8
Jack pine	33,964	25,114	3,038	216	49	45	927	--	24
White spruce	14,150	19	109	311	3,828	2,011	194	1,327	3
Black spruce	17,515	529	103	265	1,425	104	9,554	3,581	371
Balsam fir	51,104	45	214	726	13,126	612	1,651	8,917	212
Hemlock	24,731	--	69	105	482	8	112	746	--
Tamarack	6,954	8	11	26	306	27	965	2,317	2,466
Northern white-cedar	58,567	3	55	112	2,556	438	1,401	40,153	315
Other softwoods	4,544	--	177	357	3	146	3	91	--
Total	265,039	28,796	28,673	9,382	22,932	3,697	15,750	58,477	3,456
HARDWOODS									
Select white oaks	34,208	171	507	242	--	--	--	--	--
Select red oaks	65,860	2,053	902	459	27	--	--	--	--
Other red oaks	17,197	780	728	--	--	--	--	--	--
Hickory	6,447	16	29	--	--	--	--	--	--
Yellow birch	32,067	--	--	31	913	21	129	1,065	--
Hard maple	170,281	34	219	258	562	82	47	336	--
Soft maple	124,063	457	741	723	2,664	197	528	2,792	49
Beech	20,513	--	26	48	14	14	--	--	--
Ash	41,988	--	35	23	482	7	102	2,635	18
Balsam poplar	10,808	--	4	15	558	105	90	1,250	36
Cottonwood	3,236	--	--	--	--	--	--	--	--
Bigtooth aspen	42,645	241	646	169	114	8	75	221	--
Quaking aspen	86,951	777	1,164	745	3,056	864	1,237	1,551	74
Basswood	27,394	23	27	7	15	3	--	83	--
Yellow-poplar	699	--	12	--	--	--	--	--	--
Black walnut	1,423	--	10	--	--	--	--	--	--
Black cherry	18,504	89	232	84	280	61	32	40	--
Butternut	289	16	--	--	--	--	--	15	--
Elm	18,188	15	--	15	277	20	20	163	--
Paper birch	42,268	194	265	767	2,573	163	770	5,414	94
Other hardwoods	6,560	8	24	--	--	10	--	22	--
Noncommercial species	9,861	11	34	1	43	1	67	95	--
Total	781,450	4,885	5,605	3,587	11,578	1,556	3,097	15,682	271
All species	1,046,489	33,681	34,278	12,969	34,510	5,253	18,847	74,159	3,727

(Table 58 continued on next page)

(Table 58 continued)

Species group	Forest type						
	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
SOFTWOODS							
White pine	1,328	631	4,621	2,241	279	57	38
Red pine	1,467	101	1,020	2,179	190	277	26
Jack pine	2,294	14	673	1,340	132	63	35
White spruce	66	486	2,829	2,494	454	18	1
Black spruce	16	267	460	685	122	--	33
Balsam fir	108	2,553	10,920	9,995	2,013	--	12
Hemlock	53	1,086	21,233	630	207	--	--
Tamarack	4	298	110	299	98	--	19
Northern white-cedar	13	3,027	5,091	4,142	1,252	3	6
Other softwoods	98	23	611	64	--	2,968	3
Total	5,447	8,486	47,568	24,069	4,747	3,386	173
HARDWOODS							
Select white oaks	26,361	1,435	3,933	1,486	48	25	--
Select red oaks	41,513	708	12,291	7,326	485	88	8
Other red oaks	14,118	205	861	479	--	26	--
Hickory	3,863	189	2,314	27	9	--	--
Yellow birch	72	2,046	26,936	648	200	6	--
Hard maple	972	1,289	160,258	4,968	1,165	60	31
Soft maple	7,594	23,831	65,824	16,215	2,404	17	27
Beech	241	168	19,440	469	92	--	1
Ash	1,534	14,929	18,396	3,307	480	4	36
Balsam poplar	23	730	744	6,914	271	57	11
Cottonwood	273	1,554	942	467	--	--	--
Bigtooth aspen	5,133	356	7,275	27,781	552	57	17
Quaking aspen	1,535	2,803	15,928	55,222	1,781	166	48
Basswood	453	1,142	24,404	992	229	16	--
Yellow-poplar	87	66	534	--	--	--	--
Black walnut	980	154	279	--	--	--	--
Black cherry	2,439	989	11,917	2,090	80	59	112
Butternut	109	71	78	--	--	--	--
Elm	497	3,884	11,781	1,390	74	5	47
Paper birch	758	1,968	7,826	10,871	10,583	--	22
Other hardwoods	1,047	2,147	3,005	254	10	33	--
Noncommercial species	727	734	7,043	893	145	7	60
Total	110,329	61,398	402,009	141,799	18,608	626	420
All species	115,776	69,884	449,577	165,868	23,355	4,012	593

Table 59.--All live tree biomass by species group and tree biomass component, Michigan, 1980

cies group	All components	Biomass component				
		1- to 5-inch trees	Growing stock		Cull	
			Boles	Tops and limbs	Boles	Tops and limbs
			Thousand green tons			
TWOODS						
hite pine	20,468	2,040	12,189	5,518	429	292
ed pine	33,042	6,003	18,274	8,463	186	116
ack pine	33,964	6,053	18,447	8,324	692	448
hite spruce	14,150	2,227	7,919	3,748	156	100
lack spruce	17,515	8,014	6,388	3,003	61	49
alsam fir	51,104	21,194	19,971	9,251	393	295
emlock	24,731	1,754	14,402	6,586	1,218	771
amarack	6,954	2,558	2,773	1,362	132	129
orthern white-cedar	58,567	21,279	21,530	10,454	2,924	2,380
ther softwoods	4,544	2,104	1,449	648	214	129
Total	265,039	73,226	123,342	57,357	6,405	4,709
DWOODS						
elect white oaks	34,208	2,583	20,271	9,435	1,215	704
elect red oaks	65,860	2,837	41,210	18,692	1,947	1,174
ther red oaks	17,197	771	10,466	4,716	783	461
ickory	6,447	583	3,852	1,832	116	64
ellow birch	32,067	3,088	15,100	7,259	3,749	2,871
ard maple	170,281	30,610	87,477	40,694	7,030	4,470
oft maple	124,063	23,313	62,142	29,706	5,358	3,544
eech	20,513	1,720	10,289	4,991	2,116	1,397
sh	41,988	11,176	19,857	9,048	1,169	738
alsam poplar	10,808	1,494	5,947	2,809	325	233
ottonwood	3,236	168	2,002	981	40	45
igtooth aspen	42,645	5,268	23,767	11,033	1,525	1,052
uaking aspen	86,951	13,951	43,874	20,772	4,877	3,477
asswood	27,394	1,730	16,888	7,433	827	516
ellow-poplar	699	35	456	208	--	--
lack walnut	1,423	42	905	422	36	18
lack cherry	18,504	3,337	8,737	3,938	1,577	915
utternut	289	83	104	48	34	20
lm	18,188	4,187	8,690	4,085	782	444
aper birch	42,268	5,613	22,910	10,888	1,753	1,104
ther hardwoods	6,560	1,796	2,605	1,260	541	358
oncommercial species	9,861	6,101	--	--	2,458	1,302
Total	781,450	120,486	407,549	190,250	38,258	24,907
l species	1,046,489	193,712	530,891	247,607	44,663	29,616

(Table 59 continued on next page)

(Table 59 continued)

Species group	All components	Biomass component				
		1- to 5-inch trees	Growing stock		Cull	
			Boles	Tops and limbs	Boles	Tops and limbs
			Thousand cubic feet			
SOFTWOODS						
White pine	1,131,068	112,887	673,572	304,890	23,641	16,078
Red pine	1,610,038	291,070	891,315	412,806	9,130	5,717
Jack pine	1,427,846	251,957	776,430	350,438	29,733	19,288
White spruce	802,888	126,161	449,503	212,725	8,841	5,658
Black spruce	1,071,885	489,401	391,697	184,126	3,713	2,948
Balsam fir	2,332,210	967,759	910,689	421,854	18,200	13,708
Hemlock	1,044,298	73,020	607,468	277,886	52,486	33,438
Tamarack	304,032	112,436	120,639	59,273	5,878	5,806
Northern white-cedar	4,002,623	1,449,989	1,479,501	718,407	196,208	158,518
Other softwoods	217,390	100,379	69,386	31,050	10,346	6,229
Total	13,944,278	3,975,059	6,370,200	2,973,455	358,176	267,388
HARDWOODS						
Select white oaks	1,207,352	88,689	716,249	333,379	43,673	25,362
Select red oaks	2,301,853	97,392	1,439,554	653,131	69,560	42,216
Other red oaks	594,169	26,107	361,188	162,815	27,715	16,344
Hickory	223,930	19,741	134,129	63,766	4,036	2,258
Yellow birch	1,205,190	114,358	564,043	271,235	144,311	111,243
Hard maple	6,456,637	1,151,820	3,316,965	1,543,052	271,480	173,320
Soft maple	5,371,313	1,005,950	2,689,305	1,285,742	234,606	155,710
Beech	801,391	66,863	400,899	194,466	83,711	55,452
Ash	1,738,454	453,626	827,394	377,093	49,025	31,316
Balsam poplar	548,734	75,524	301,969	142,647	16,635	11,959
Cottonwood	137,982	7,140	85,295	41,807	1,759	1,981
Bigtooth aspen	2,041,960	250,260	1,138,168	528,443	73,997	51,092
Quaking aspen	4,151,373	662,709	2,093,648	991,308	235,514	168,194
Basswood	1,363,727	85,636	840,652	369,993	41,478	25,968
Yellow-poplar	36,947	1,833	24,127	10,987	--	--
Black walnut	53,010	1,541	33,739	15,720	1,336	674
Black cherry	838,502	149,496	395,937	178,499	72,326	42,244
Butternut	13,082	3,728	4,660	2,191	1,577	926
Elm	714,324	162,761	341,942	160,732	31,100	17,789
Paper birch	1,758,968	233,624	952,433	452,713	73,686	46,512
Other hardwoods	275,322	74,810	109,190	52,829	23,139	15,354
Noncommercial species	414,445	253,942	--	--	104,892	55,61
Total	32,248,665	4,987,550	16,771,486	7,832,548	1,605,556	1,051,52
All species	46,192,943	8,962,609	23,141,686	10,806,003	1,963,732	1,318,91

Table 60.--Removals[1/], net annual growth, and inventory of growing stock on commercial forest land, Michigan, 1980, and low removals option projections[2/] to 2010

(In million cubic feet)

Year	Removals			Growth			Inventory		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
1980	274.6	56.4	218.2	677.8	205.5	472.3	19,103.8	5,355.6	13,748.2
1990	284.0	57.8	226.2	852.0	227.7	624.3	24,122.8	6,982.0	17,140.8
2000	371.1	83.5	287.6	838.9	227.9	611.0	29,498.0	8,588.3	20,909.7
2010	456.0	109.5	346.5	674.2	214.7	459.5	33,167.9	9,863.8	23,304.1

[1/]Timber removals includes volume "lost" due to land clearing, flooding, thinning, or changes in land use, in addition to timber cut and used.

[2/]Based on the following assumptions: (a) that the overall removals rate will be lower than that for the high removals option; (b) that the percent of annual change for removals will be as shown in Table 5 (in text); (c) that the total area of commercial forest land will decline from 17.5 million acres in 1980 to 17.2 million acres in 2010; (d) that radial growth will decline in relation to the increase of basal area per acre of trees; (e) that the intensity of forest management will continue at the rate indicated by recent trends; (f) that the volume of "other" removals will drop during the period as more of these trees are utilized for products.

Table 61.--Removals[1], net annual growth, and inventory of growing stock on commercial forest land, Michigan, 1980, and high removals option projections[2] to 2010

(In million cubic feet)

Year	Removals			Growth			Inventory		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
1980	274.6	56.4	218.2	677.8	205.5	472.3	19,103.8	5,355.6	13,748.2
1990	357.2	84.9	272.3	845.6	225.6	620.0	23,719.9	6,852.2	16,867.7
2000	494.8	141.4	353.4	819.8	220.4	599.4	28,014.7	7,999.2	20,015.5
2010	637.7	196.7	441.0	638.5	198.6	439.9	29,941.3	8,460.8	21,480.5

[1]Timber removals includes volume "lost" due to land clearing, flooding, thinning, or changes in land use, in addition to timber cut and used.

[2]Based on the following assumptions: (a) that the overall removals rate will be higher than that for the low removals option; (b) that the percent of annual change for removals will be as shown in Table 5 (in text); (c) that the total area of commercial forest land will decline from 17.5 million acres in 1980 to 17.2 million acres in 2010; (d) that radial growth will decline in relation to the increase of basal area per acre of trees; (e) that the intensity of forest management will continue at the rate indicated by recent trends; (f) that the volume of "other" removals will drop during the period as more of these trees are utilized for products.

Table 62.--Sampling errors[1] for estimates smaller than the Unit totals of volume, net growth, removals, and area of commercial forest land, Michigan, 1980

pling	Commercial	Growing stock			Sawtimber		
ror	forest area	Inventory	Growth	Removals	Inventory	Growth	Removals
ercent	Thousand acres	- - - -Million cubic feet- - - -			- - - -Million board feet[2] - - -		
1	1,898.8	9,415.2	731.7	14,102.5	55,754.1	7,199.6	63,265.7
2	474.7	2,353.8	182.9	3,525.6	13,938.5	1,799.9	15,816.4
3	211.0	1,046.1	81.3	1,566.9	6,194.9	800.0	7,029.5
4	118.7	588.5	45.7	881.4	3,484.6	450.0	3,954.1
5	76.0	376.6	29.3	564.1	2,230.2	288.0	2,530.6
10	19.0	94.2	7.3	141.0	557.5	72.0	632.7
15	8.4	41.8	3.3	62.7	247.8	32.0	281.2
20	4.7	23.5	1.8	35.3	139.4	18.0	158.2
25	3.0	15.1	1.2	22.6	89.2	11.5	101.2
50	0.8	3.8	0.3	5.6	22.3	2.9	25.3
100	0.2	0.9	0.1	1.4	5.6	0.7	6.3

[1]At the 68-percent probability level.

[2]International 1/4-inch rule.

U.S. Government Printing Office: 1984—766-136/5199 Region No. 6

Spencer, John S., Jr.; Hahn, Jerold T.
Michigan's fourth forest inventory: timber volumes and projections of timber supply. Resour. Bull. NC-72. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1984. 95 p.

The fourth inventory of the timber resource of Michigan shows growing-stock volume increased 27 percent between 1966 and 1980, from 15.1 to 19.1 billion cubic feet. Presented are highlights and statistics on volume, growth, mortality, removals, biomass, and projections.

KEY WORDS: Timber resource, statistics, growth, mortality, removals

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Timber Resource of Wisconsin's Northwest Survey Unit, 1983

W. Brad Smith

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Information contained in this report includes the most commonly used Forest Inventory and Analysis statistics. However, additional forest resource data can be provided to interested users. Persons requesting additional information that can be provided from the raw inventory data are expected to pay for the retrieval costs. These costs will vary depending on the complexity of the request, from less than $100 for a relatively simple request to $2,000 for a complex retrieval involving services of a Forest Inventory and Analysis computer programmer. If requests for data conflict with ongoing Forest Inventory and Analysis work, they will be scheduled so as to minimize the impact on the work unit.

Requests for unpublished information may be directed to:

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Area served: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, Wisconsin.

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FOREWORD

Forest Inventory and Analysis (FIA) is a continuing endeavor as mandated by the Renewable Forest and Rangeland Resources Planning Act of 1974. Prior inventories were mandated by the McSweeney-McNary Forest Research Act of 1928. The objective of FIA is to periodically inventory the Nation's forest land to determine its extent, condition, and volume of timber, growth, and depletions. Up-to-date resource information is essential to frame intelligent forest policies and programs. USDA Forest Service regional experiment stations are responsible for conducting these inventories and publishing summary reports for individual States. The North Central Forest Experiment Station is responsible for forest resource evaluation in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, and Wisconsin.

Fieldwork for the Wisconsin Statewide forest inventory was begun in the summer of 1981 and completed in late 1983. Reports on the three previous Forest Service inventories of Wisconsin's timber resource are dated 1936, 1956, and 1968.

Similar Resource Bulletins reporting statistical highlights and detailed tables on the other Units in Wisconsin will soon be available. In addition to these statistical reports, a series of analytical reports will also be published.

More accurate survey information was obtained during the 1983 survey than otherwise would have been feasible because of intensified field sampling. Such sampling was made possible by additional funding and field personnel provided the North Central Station by the Wisconsin State Legislature through the Department of Natural Resources. Data from the Departments' canvass of all primary wood-using plants in the State was used to help estimate the quantity of timber products harvested in Wisconsin.

Aerial photos used in the Northwest Unit Forest Inventory were furnished by the Wisconsin Department of Natural Resources, the USDA Agricultural Stabilization and Conservation Service, and the Chequamegon National Forest.

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TIMBER RESOURCE OF WISCONSIN'S NORTHWEST SURVEY UNIT, 1983

W. Brad Smith, *Mensurationist*

HIGHLIGHTS

Forest Area

Forest land accounted for 5.4 million acres (67 percent of the Unit's land area) in 1983, this constitutes no change since 1968.

Commercial forest land occupied 5.1 million acres in 1983, and 5.2 million acres in 1968—a decline of less than 2 percent.

Productive-reserved forest land totaled 114,600 acres in 1983, compared to 5,500 acres in 1968. Major additions since 1968 include the Apostle Islands National Lakeshore, St. Croix Wild and Scenic Riverway, Flambeau River Wilderness area, and the Rainbow Lake Wilderness area.

Bayfield County contained the largest area of commercial forest in 1983 (740,500 acres) and in 1968 (777,300 acres).

Farmers and miscellaneous private individuals continued to hold 2.3 million acres (45 percent of the commercial forest) in 1983. A new definition of farm ownership shifted much of what was previously farmer owned to the miscellaneous private category.

County and municipal agencies owned 1.1 million acres of commercial forest in 1983 (21 percent).

The aspen and maple-birch forest types continue to dominate the commercial forest land base in 1983 comprising 59 percent of the commercial forest area.

Poletimber stands occupied 50 percent of the commercial forest in 1983 as compared to 54 percent in 1968.

Sawtimber stands, which increased by 510,900 acres between surveys, amounted to 22 percent of the commercial forest in 1983, compared to 12 percent in 1968.

Fifty-one percent of the commercial plantation area is in the red pine type (97,900) acres and 38 percent is in the jack pine type (72,500 acres).

Nineteen percent of all commercial forest area has balsam fir as a prominent conifer in the understory.

- Less than 4 percent of all forest land is unproductive or reserved.
- Stands aged 80 years or more increased from 7 percent of the commercial forest area in 1968 to 10 percent in 1983.
- The average site index for commercial forest land in the Unit is 64 feet.

Timber Volume

- The volume of growing stock volume in 1983 was 5.3 billion cubic feet, 33 percent greater than the 3.9 billion in 1968.
- Sawtimber volume amounted to 10.1 billion board feet in 1983, 68 percent greater than the 1968 volume.
- The 4.0 billion cubic feet of hardwoods make up 75 percent of the growing-stock volume.
- White spruce growing-stock volume increased 363 percent since 1968 and red pine growing-stock volume increased 224 percent. Ingrowth of plantations to merchantable size was the dominant factor in these dramatic increases.
- The aspens (1.1 billion cubic feet), maples (1.0 billion), and oaks (0.5 billion) contain the highest volumes, and together account for nearly half of the growing-stock volume.
- Average growing-stock volume per acre in 1983 was 1,032 cubic feet, compared to 743 cubic feet in 1968.
- Forty-seven percent of the growing-stock volume is in stands aged 41 to 60 years.
- Nearly three-quarters of the sawtimber volume is in trees with grade 3 butt logs. Tree diameter is generally the limiting criteria.
- The volume in cull trees (rough, rotten, and short-log cull) is 648 million cubic feet; salvable dead tree volume is 280 million cubic feet.

Stand Conditions

- Net annual growth on growing-stock trees was 179 million cubic feet in 1982.

- The net annual growth rate of growing stock was 3.4 percent of inventory in 1982.
- Net growth averaged 33.7 cubic feet per acre in 1982.
- Annual mortality of growing stock amounted to 49 million cubic feet (0.9 percent of inventory) in 1982.
- Disease accounted for 18 percent of the mortality in 1982; chiefly diseases of aspen and elm.

Timber Use

- Timber removals from growing stock in 1981 totaled nearly 96 million cubic feet (1.8 percent of inventory), compared to 78 million cubic feet (1.9 percent of inventory) in 1967.
- The aspens made up 46 percent of the 1981 removals volume, although they account for only 22 percent of the growing-stock volume.
- Output of roundwood products totaled 110 million cubic feet in 1981; 62 percent was pulpwood, 17 percent was saw logs, and 17 percent was fuelwood.
- Wood residue from primary plants totaled 8.5 million cubic feet in 1981, 0.3 million of which were not used.

Biomass

- Highest yields of live tree biomass are in the white pine (85 green tons per acre) and the maple-birch (84 tons) forest types.
- Live tree biomass (trees greater than 1-inch in d.b.h.) totaled 332 million green tons (64 tons per acre) in 1983, nearly one half in the boles of growing-stock trees.

APPENDIX

ACCURACY OF SURVEY

Forest Inventory and Analysis information is based on a sampling procedure designed to provide reliable statistics at the State and Unit levels. Consequently, the reported figures are estimates only. A measure of reliability of these figures is given by sampling errors. These sampling errors mean that the chances are two out of three that if a 100-percent inventory had been taken, using the same methods, the results would have been within the limits indicated.

For example, the estimated growing-stock volume in the Northwest Unit in 1983, 5,311.4 million cubic feet, has a sampling error of ± 1.49 percent (± 79.1 million cubic feet). The growing-stock volume from a 100-percent inventory would be expected to fall between 5,232.3 and 5,390.5 million cubic feet (5,311.4 ± 79.1), there being a one in three chance that this is not the case.

Sampling errors were calculated separately for national forest land and other land because of the difference in the way the inventories were conducted. For example, the sampling error for growing-stock volume on land other than national forest is ± 1.56 percent but for Chequamegon National Forest land it is ± 4.39 percent. Different survey intensities resulted in different sampling errors.

The following tabulation shows the sampling errors for the 1983 Northwest Unit Forest Inventory:

Item	Unit totals	Sampling error
Growing stock	(Million cubic feet)	(Percent
Volume	5,311.4	1.49
Growth	179.2	3.13
Removals	95.4	16.29
Sawtimber	(Million board feet)[1]	
Volume	10,057.4	2.44
Removals	249.6	19.95
Commercial forest land	(Thousand acres) 5,150.8	0.49

As survey data are broken down into section smaller than Survey Unit totals, the sampling erro increases. For example, the sampling error fo growing-stock volume in a particular county is highe than that for total growing-stock volume in the Un (table 66 shows the sampling errors for estimate smaller than Unit totals).

SURVEY PROCEDURES

We used a two-phase sampling design for the 198 Wisconsin survey. This sampling scheme and ass ciated estimators are similar to sampling with parti replacement (SPR) in that a set of randomly locate plots was available for remeasurement and a set new randomly located plots were established a measured. Major enhancements in the new Wiscons design were stratification for disturbance on the o

[1] *International ¼-inch rule.*

sample and use of a growth model to improve regression estimates made on the old undisturbed forest plots. The growth model used was the Stand and Tree Evaluation and Modeling System (STEMS).[2]

The major steps in the new survey design were as follows:

1. The first phase of the design was aerial photo interpretation. In this phase two sets of random points were located on current aerial photographs. The first was a set of new photo points and the second was a set of relocated old photo points (ground plot locations from the previous inventory). A total of 42,566 1-acre points, including old ground sample locations, were systematically distributed across aerial photos of the entire Unit, except the Chequamegon National Forest. These points were classified into land classes as shown below to make a preliminary estimate of forest area. Next, a total of 30,121 of these points were stereoclassified as to stand-size class and density. Finally, a total of 3,973 points were examined on the ground to correct the preliminary area estimate for errors in classification and for actual changes in land use since the photos were taken.

	Photo points		Inventory plots
Land class	Classified	Stereoclassified	checked
Forest land	28,710	28,710	2,583
Unproductive/ reserved forest land	652	652	76
Nonforest land			
with trees	759	759	55
without trees	10,775	0	1,118
water	1,670	0	141
Total	42,566	30,121	3,973

2. The second phase of the design is a ground sample. The plot selection and measurement procedures of phase two of the new Wisconsin survey design are outlined in figure 1.

From the new photo points, a random sample of ground plots were established and measures of land use, volume, mortality and cutting were recorded. At each forest ground plot location, variable-radius plots (basal area factor 37.5) were established at 10 points

[2]*For more information on STEMS, see: Belcher, D. L.; Holdaway, M. R.; Brand, G. J. A description of STEMS: The stand and tree evaluation and modeling system. Gen. Tech. Rep. NC-79. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1981. 18 p.*

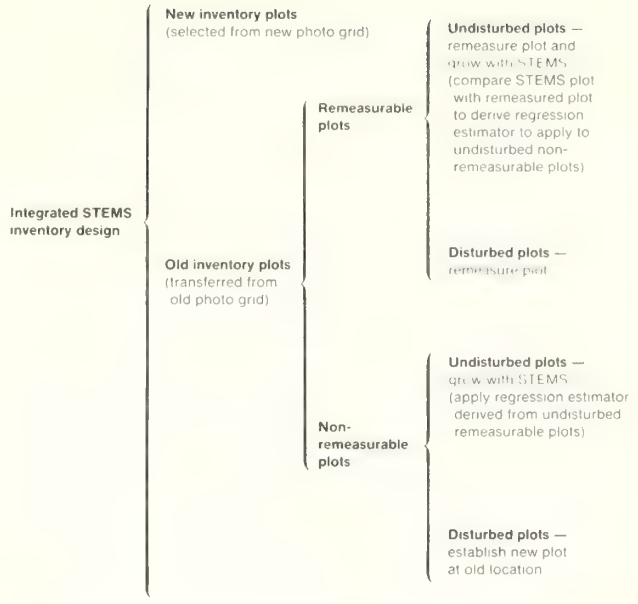
Integrated STEMS inventory design
New inventory plots
(selected from new photo grid)
Old inventory plots
(transferred from old photo grid)
Remeasurable plots
Non-remeasurable plots
Undisturbed plots — remeasure plot and grow with STEMS (compare STEMS plot with remeasured plot to derive regression estimator to apply to undisturbed non-remeasurable plots)
Disturbed plots — remeasure plot
Undisturbed plots — grow with STEMS (apply regression estimator derived from undisturbed remeasurable plots)
Disturbed plots — establish new plot at old location

Figure 1.—*Logic structure for the 1983 Wisconsin sample design.*

uniformly placed over the sample acre. These locations were monumented for future remeasurement.

On the old inventory photo points (old plot locations) we used a somewhat different procedure. Old plots were either remeasurable (monumented) or nonremeasurable (not monumented and thus difficult to relocate in the field). Within both of these groups, old plots were additionally identified as undisturbed or disturbed. The remeasurable old inventory photo points which are classified as forest undisturbed were remeasured on the ground to obtain measurements of current land use, volume, growth and removals. Additionally, all forest undisturbed remeasurable plots were projected to the current time using STEMS, to provide estimates of current volume and growth. The comparison of the projected and observed values on these plots provided regression estimators to adjust the projected values of the undisturbed nonremeasurable plots. All disturbed remeasurable plots were remeasured on the ground to assess changes since the last inventory. Disturbance as used here refers to any change on a plot that can be detected on aerial photos and which the STEMS growth processor cannot predict, such as; catastrophic mortality, cutting, seedling stands, and land use change.

The nonremeasurable forest points are those that were not monumented during the 1968 inventory but played a crucial role in the new survey design. The nonremeasurable undisturbed forest points were visited on the ground at the time of the last survey and following careful examination of both past and current photographs it was determined that nothing happened that STEMS was unable to simulate. STEMS was

then used to update the old plot and tree data to produce an estimate of current data. Thus these points became ground plots even though the information was obtained without actually visiting the plot. The plot record for each updated plot was sent to the field for verification of current ownership information. For points classified as disturbed, a new ground plot was established as close to the old location as possible. This allowed information about land use trends to be recorded even though the old plot could not be exactly relocated for remeasurement.

The estimation procedure for computing statistics from this sampling design was more complicated than the simple two-phase estimation procedure used in the past. In fact, this procedure yielded two independent samples, one coming from the new photo points and the other from the old photo points that were remeasured or projected. A more detailed description of the sampling design is available in a separate publication.[3]

3. Under an agreement with the Forest Service's Eastern Region 9, North Central crews remeasured 10-point variable radius plots on the Chequamegon National Forest at the same time they remeasured other plots in the Northwest Unit. The Chequamegon National Forest provided the Station with area of commercial forest land by forest type, stand-size class, and density for the forest. The Station then computed volume, growth, and mortality statistics. Area and volume tables for the forest were approved by the Chequamegon National Forest staff before publication.

4. Statistics on timber utilization during 1981 were obtained from mill surveys. The Wisconsin Department of Natural Resources canvassed resident sawmills, veneer mills, and other primary wood-using plants. The North Central Forest Experiment Station canvassed out-of-State sawmills, pulpmills, and veneer mills to determine their use of Wisconsin timber. Fuelwood and fence post output was based on a sample of public and private landowners to determine their production of fuelwood and fenceposts. Estimates of primary mill residue used for fuelwood were obtained from the canvass of Wisconsin primary wood-using plants. Timber cut for products by ownership class was determined by a canvass of public and industrial timber owners. The portion of timber cut unaccounted for by these owners was listed under "farmer and other owners".

[3]*For more information see: Hahn, J. T.; Hansen, M. H.; Fairweather, S. E. A sampling procedure incorporating a growth simulator. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1984. (In prep.)*

5. A total of 2,568 felled trees on 133 active logging operations were measured throughout the State during 1981-1982 to develop wood utilization factors for converting timber products output to timber removals for saw logs and pulpwood. Factors for all other products were obtained during the 1966-1967 Wisconsin utilization study.

6. Field data were sent to St. Paul, Minnesota, for processing and analysis.

COMPARING WISCONSIN'S FOURTH INVENTORY WITH THE THIRD INVENTORY

Data from new forest inventories are often compared with data from earlier inventories to determine trends in forest resources. However, changes in procedures and definitions between surveys often make it necessary to adjust earlier survey data so that they are comparable to data from the new survey. A consistency check will be made for each forest unit in Wisconsin to ensure that the changes observed between inventories reflect actual changes in the resource and not changes in definitions or procedures.

Identifying and Correcting Procedural Changes

Some procedural changes were made between the 1968 and 1983 inventories of northwest Wisconsin in the method of deriving annual mortality estimates and determining forest type.

Mortality figures for the 1968 inventory were based on field estimates from nonremeasurement plots. Information gathered on remeasurement plots during the current inventory was used to adjust the 1968 mortality figures. This adjustment also changed the estimate of net growth for the 1968 inventory. Additionally, the old spruce-fir forest type was separated into two distinct types for the new inventory—white spruce and balsam fir. Comparisons with old data may be made by adding the two new types together.

Except for the net growth and mortality information, the old and new inventories of this region may be directly compared.

Checking for Consistency

A test was made to ensure that it was possible to move from the adjusted 1968 resource statistics to the 1983 values by means of Timber Resource Analysis System (TRAS), a USDA Forest Service computer program for updating, backdating, and projecting

timber volume, growth, mortality, and removals. Using the adjusted 1968 numbers of softwood and hardwood trees by 2-inch diameter class and applying 1983 cubic feet per tree estimates, volumes were generated for the 1968 inventory that are comparable with 1983 volumes. Then, using growth rates, mortality rates, and removals rates for the period between the two surveys, TRAS projected the inventory from 1968 to 1983. The program prints out volumes by diameter class for softwoods and hardwoods for selected years in the period. Thus, inconsistencies in volume, growth, mortality, and removals were identified and resolved.

TRAS generates an estimate of what total removals had to be in order for the inventory to have changed as it did between surveys, given the volume, growth, and mortality inputs. Estimates of removals for products and for logging residues, two of the three components of total timber removals, were available from an independent utilization study. An estimate of "other" removals (see Definition of Terms in Appendix), the third component of total removals, was made by subtracting the first two removals components from the TRAS-generated total removals estimate. This estimate of "other" removals was compared with findings from remeasurement plots and new plots (stump counts and land use change) to check its validity. When necessary, TRAS was rerun and adjusted until other removals were compatible with the estimate from field data. Total removals were "trend level removals" because the estimate of "other" removals was based on a removals trend line from 1968 to 1983.

LOG GRADE

In Wisconsin's Northwest Unit the butt log of every sawtimber tree on every full permanent sample plot was graded for quality.

Butt logs were graded on the basis of external characteristics as indicators of quality. Hardwood species were graded according to Hardwood Log Grades for Standard Lumber.[4] The best 12-foot section of the lowest 16-foot hardwood log, or the best 12-foot upper section if the butt log did not meet minimum log-grade standards, was graded as follows:

[4] *Vaughn, C. L.; Wollin, C. A.; McDonald, K. A.; Bulgrin, E. H. Hardwood log grades for standard lumber. Res. Pap. FPL-63. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory; 1966. 52 p.*

Forest Service standard grades for hardwood factory saw logs

Grading factors		Specifications							
		Log grade 1			Log grade 2				Log grade 3
Position in tree		Butts only	Butts and uppers		Butts and uppers				Butts and uppers
Scaling diameter, inches		13-15[1]	16-19	20+	11+[2]	12+			8+
Length without trim, feet			10+		10+	8-9	10-11	12+	8+
Required clear cuttings[3] of each of three best faces[4]	Min. length, feet	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	No Limit
	Min. proportion of log length required in clear cutting	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep and crook allowance	For logs with less than one-fourth of end in sound defects		15 percent			30 percent			35 percent
	For logs with more than one-fourth of end in sound defects		15 percent			20 percent			35 percent
Maximum scaling deduction			40 percent[5]			50 percent[6]			50 percent

[1]Ash and basswood butts can be 12 inches if they otherwise meet requirements for small #1's.
[2]Ten-inch logs of all species can be #2 if they otherwise meet requirements for small #1's.
[3]A clear cutting is a portion of a face, extending the width of the face, that is free of defects.
[4]A face is one-fourth of the surface of the log as divided lengthwise.
[5]Otherwise #1 logs with 41-60 percent deductions can be #2.
[6]Otherwise #2 logs with 51-60 percent deductions can be #3.

Forest Service standard specifications for hardwood construction logs (tie and timber logs)[1]

Position in tree		Butt and upper
Min. diameter, small end		8 inches +
Min. length, without trim		8 feet
Clear cuttings		No requirements.
Sweep allowance, absolute		One-fourth of the diameter at the small end for each 8 feet of length.
Sound surface defects	Single knots	Any number, if no one knot has an average age diameter above the callus in excess of one-third of log diameter at point of occurrence.
	Whorled knots	Any number if sum of knot diameters above the callus does not exceed one-third of log diameters at point of occurrence.
	Holes	Any number provided none has a diameter over one-third of log diameter at point of occurrence, and none extends over 3 inches into included timber.[2]
Unsound surface defects		Same requirements as for sound defects if they extend into included time.[2] No limit if they do not.
End defects	Sound	No requirements.
	Unsound	None allowed; log must be sound internally, but will admit one shake not to exceed one-fourth of the scaling diameter will admit a longitudinal split not extending over 5 inches into the contained timber.

[1]These specifications are minimum for the class. If, from a group of logs, factory logs are selected first, thus leaving only nonfactory logs from which to select construction logs, then the quality range of the construction logs so selected is limited, and the class may be considered a grade. If selection for construction logs is given first priority, then it may be necessary to subdivide the class into grades.

[2]Included timber is always square, and dimension is judged from small end.

Softwood species were graded according to the following specifications:

Log Grades for Eastern White Pine

Log grade	Minimum size Diameter	Minimum size Length[1]	Sweep or crook allowance	Total cull allowance including sweep	Maximum weevil injury	Allowable knot size (inches)[2] on three best faces or minimum clearness of four faces
	Inches	*Feet*	--------*Percent*--------		*Number*	*Inches*
1	12 & 13	8-16	20	50	0	Four faces clear full length
	14+	10-16	20	50	0	Two faces clear full length, or four faces clear 50 percen length (6 feet min. length)[3]
2	6+	8-16	30	50	0	Sound knots l.e.[4] D/6 and less than 3 inches[5] Unsound knots: l.e. 1½ inches and for: butt, lots l.e. D 12 upper logs l.e. D/10 or four faces clear 50 percent of length
3	6+	8-16	40	50	8-foot logs 1 weevil 10-foot+ logs: 2 weevil	Sound knots l.e. D/3 and less than 5 inches. Unsound knots l.e.D/6 and less than 2½ inches.
4	6+	8-16	50	50	No limit	No limit

[1]Plus trim.
[2]Disregard all knots less than ½-inch diameter in all grades.
[3]The sum of the diameter of sound knots plus twice the sum of the diameter of unsound knots (in inches) is less than or equal to ½ of the diameter of the log (inches).
[4]l.e. means less than or equal to.
[5]D means d.i.b. of log at location of knot.

LOG GRADES FOR JACK PINE AND RED PINE

Grade 1: logs with three or four clear faces.[5]

Grade 2: logs with one or two clear faces.

Grade 3: logs with no clear faces.

After the tentative log grade is established, the log will be degraded one grade for each of the following, except that no log can be degraded below grade 3. Net scale after deduction for defect must be at least 50 percent of the gross contents of the log.

1. *Sweep.* Degrade any tentative 1 or 2 log one grade if sweep amounts to 3 or more inches and equals or exceeds one-third the diameter inside bark at smal end.

2. *Heart rot.* Degrade any tentative 1 or 2 log grad if conk, massed hyphae, or other evidence of advanc heart rot is found anywhere in it.

[5]*A face is one-fourth of the circumference in width extending full length of the log. Clear faces are those free of: knots measuring more than ½-inch in diameter, overgrown knots of any size, holes more than ¼-inch in diameter. Faces may be rotated to obtain the maximum number of clear ones.*

LOG GRADES FOR ALL OTHER SOFTWOOD LOGS

Grade 1

1. Logs must be 16 inches in diameter or larger, 1 feet or longer, and with deduction for defect no over 30 percent of gross scale.
2. Logs must be at least 75 percent clear on each o three faces.
3. All knots outside clear cutting must be sound an not over 2-½ inches in size.

Grade 2

1. Logs must be 12 inches in diameter or larger, 1 feet or longer, and with a net scale after deductio

for defect of at least 50 percent of the gross contents of the log.

2. Logs must be at least 50 percent clear on each of three faces or 75 percent clear on two faces.

Grade 3

1. Logs must be 6 inches in diameter or larger, 8 feet or longer, and with a net scale after deduction for defect of at least 50 percent of the gross contents of the log.

Note: (A) Diameters are diameter inside bark (d.i.b.) at small end of log.
(B) Percent clear refers to percent clear in one continuous section.

METRIC EQUIVALENTS OF UNITS USED IN THIS REPORT

1 acre = 4,046.86 square meters or 0.405 hectare.
1,000 acres = 405 hectares.
1 cubic foot = 0.0283 cubic meter.
1 foot = 30.48 centimeters or 0.3048 meter.
1 inch = 25.4 millimeters, 2.54 centimeters, or 0.0254 meter.
1 pound = 0.454 kilogram.
1 ton = 0.907 metric ton.

TREE SPECIES GROUPS IN WISCONSIN'S NORTHWEST UNIT[6]

SOFTWOODS
- Jack pine ..... *Pinus banksiana*
- Red pine ..... *Pinus resinosa*
- Eastern white pine ..... *Pinus strobus*
- White spruce ..... *Picea glauca*
- Black spruce ..... *Picea mariana*
- Balsam fir ..... *Abies balsamea*
- Eastern hemlock ..... *Tsuga canadensis*
- Tamarack ..... *Larix laricina*
- Northern white-cedar ..... *Thuja occidentalis*
- Other softwoods
  - Eastern redcedar ..... *Juniperus virginiana*
  - Norway spruce ..... *Picea abies*
  - Scotch pine ..... *Pinus sylvestris*

HARDWOODS
- White oaks
  - White oak ..... *Quercus alba*
  - Swamp white oak ..... *Quercus bicolor*
  - Bur oak ..... *Quercus macrocarpa*
  - Chinkapin Oak ..... *Quercus muehlenbergii*
- Select red oak
  - Northern red oak ..... *Quercus rubra*
- Other red oaks
  - Northern pin oak ..... *Quercus ellipsoidalis*
  - Black oak ..... *Quercus velutina*
- Select hickory
  - Shagbark hickory ..... *Carya ovata*
- Other hickory
  - Bitternut hickory ..... *Carya cordiformis*
- Yellow birch ..... *Betula alleghaniensis*
- Hard maple
  - Sugar maple ..... *Acer saccharum*
  - Black maple ..... *Acer nigrum*
- Soft maples
  - Red maple ..... *Acer rubrum*
  - Silver maple ..... *Acer saccharinum*
- Ashes
  - White ash ..... *Fraxinus americana*
  - Black ash ..... *Fraxinus nigra*
  - Green ash ..... *Fraxinus pennsylvanica*
- Balsam poplar ..... *Populus balsamifera*
- Eastern cottonwood ..... *Populus deltoides*
- Sycamore ..... *Platanus occidentalis*
- Aspens
  - Bigtooth aspen ..... *Populus grandidentata*
  - Quaking aspen ..... *Populus tremuloides*
- American basswood ..... *Tilia americana*
- Beech ..... *Fagus grandifolia*
- Black walnut ..... *Juglans nigra*
- Black cherry ..... *Prunus serotina*
- Butternut ..... *Juglans cinerea*
- Elms
  - American elm ..... *Ulmus americana*
  - Slippery elm ..... *Ulmus rubra*
  - Rock elm ..... *Ulmus thomasii*
- Hackberry ..... *Celtis occidentalis*
- Paper birch ..... *Betula papyrifera*
- Black willow ..... *Salix nigra*
- Other hardwoods
  - Boxelder ..... *Acer negundo*
  - Black locust ..... *Robinia pseudoacacia*
  - Honeylocust ..... *Gladitsia triacanthos*
  - River birch ..... *Betula nigra*
  - Red mulberry ..... *Morus rubra*
  - Blackgum ..... *Nyssa silvatica*
  - Northern Catalpa ..... *Catalpa speciosa*
- Noncommercial species
  - Mountain maple ..... *Acer spicatum*
  - Eastern hophornbeam ..... *Ostrya virginiana*
  - Peachleaf willow ..... *Salix amygdaloides*

[6]*The common and scientific names are based on: Little, Elbert L. Check list of native and naturalized trees of the United States. Agric. Handb. 541. Washington, DC: U.S. Department of Agriculture, Forest Service; 1979. 375 p.*

American hornbeam .... *Carpinus caroliniana*
Hawthorn ..... *Crataegus* spp.
Striped maple ..... *Acer pensylvanicum*
Mountain ash ..... *Sorbus* spp.
Pin cherry ..... *Prunus pensylvanica*
Chokecherry ..... *Prunus virginiana*

DEFINITION OF TERMS

Acceptable trees.—Growing-stock trees of commercial species that meet specified standards of size and quality but do not qualify as desirable trees.

Basal area.—The area in square feet of the cross section at breast height of a single tree. When the basal area of all trees in a stand are summed, the result is usually expressed as square feet of basal area per acre.

Biomass.—The above-ground volume of all live trees (including bark and foliage) reported in green tons. Biomass is made up of 5 components:

Growing-stock bole.—Biomass of a growing-stock tree from a 1-foot stump to a variable 4-inch top.

Growing-stock tops and limbs.—Biomass of a growing-stock tree from a 1-foot stump minus the growing-stock bole.

Cull bole.—Biomass of a cull tree from a 1-foot stump to a variable 4-inch top.

Cull tops and limbs.—Biomass of a cull tree from a 1-foot stump minus the cull bole.

1- to 5-inch trees.—Biomass of all live trees 1- to 5-inches in diameter at breast height.

Commercial forest land.—Forest land producing or capable of producingcrops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commercial forest land are capable of producing more than 20 cubic feet per acre per year of annual growth under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for producing of industrial wood in the foreseeable future.) Also see definition of pastured commercial forest land.

Commercial species.—Tree species presently or prospectively suitable for industrial wood products. (Note: Excludes species of typically small size, poor form, or inferior quality such as hophornbeam and hawthorn.)

County and municipal land.—Land owned by counties and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

Cull.—Portions of a tree that are unusable for industrial wood products, because of rot, form, or other defect.

Desirable trees.—Growing-stock trees having no serious defects in quality limiting present or prospective use, having relatively high vigor, and containing no pathogens that may kill or seriously deteriorate them before rotation age. These trees would be favored by forest managers in silvicultural operations.

Diameter classes.—A classification of trees based on diameter outside bark, measured at breast height (4-½ feet above the ground). (Note: d.b.h. is the common abbreviation for diameter at breast height. Two-inch diameter classes are commonly used in Forest Survey, with the even inch the approximate midpoint for a class. For example, the 6-inch class includes trees 5.0 through 6.9 inches d.b.h.)

Farm.—Either a place operated as a unit of 10 or more acres from which the sale of agricultural products totals $50 or more annually, or a place operated as a unit of less than 10 acres from which the sale of agricultural products for a year amounts to at least $250. Places having less than the $50 or $250 minimum estimated sales in a given year are also counted as farms if they can normally be expected to produce goods in sufficient quantity to meet the requirements of the definition.

Farmer-owned land.—Land owned by farm operators. (Note: Excludes land leased by farm operators from nonfarm owners, such as railroad companies and States.)

Forest land.—Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currentlydeveloped for nonforestuse. (Note: Stocking is measured by comparison of basal area and/ornumber of trees, by age or size and spacing with specified standards.) The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas shall be classed as forest if less than 120 feet wide. Also see definitions for land area, commercial forest land, noncommercial forest land, productive-reserved forest land, stocking, unproductive forest land, and water.

Forest industry land.—Land owned by companies or individuals operating primary wood-using plants.

Forest trees.—Woody plants having a well-developed stem and usually more than 12 feet tall at maturity.

Forest type.—A classification of forest land based on the species forming a plurality of live tree stocking. Major forest types in the State are:

Jack pine.—Forests in which jack pine comprises a plurality of the stocking. (Common associates include eastern white pine, red pine, aspen, birch, and oak.)

Red pine.—Forests in which red pine comprises a plurality of the stocking. (Common associates include eastern white pine, jack pine, aspen, birch, and oak.)

White pine.—Forests in which eastern white pine comprises a plurality of the stocking. (Common associates include red pine, aspen, birch, and maple.)

Balsam fir.—Forests in which balsam fir and white spruce comprise a plurality of stocking with balsam fir the most common. (Common associates include white spruce, aspen, maple, birch, northern white-cedar, and spruce.)

White spruce.—Forests in which white spruce and balsam fir comprise a plurality of the stocking with white spruce the most common. (Common associates include balsam fir, aspen, maple, birch, and northern white-cedar.)

Black spruce.—Forests in which swamp conifers comprise a plurality of the stocking with black spruce the most common. (Common associates include tamarack, northern white-cedar, and balsam fir.)

Northern white-cedar.—Forests in which swamp conifers comprise a plurality of the stocking with northern white-cedar the most common. (Common associates include spruce and balsam fir.)

Tamarack.—Forests in which swamp conifers comprise a plurality of the stocking with tamarack the most common. (Common associates include black spruce, balsam fir, and aspen.)

Oak-hickory.—Forests in which northern red oak, white oak, bur oak, or hickories, singly or in combination, comprise a plurality of the stocking. (Common associates include jack pine, aspen, birch, and maple.)

Elm-ash-soft maple.—Forests in which lowland elm, ash, cottonwood, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include aspen, birch, and balsam fir.)

Maple-birch.—Forests in which sugar maple, basswood, yellow birch, elm, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include white pine, elm, hemlock, and basswood.)

Aspen.—Forests in which quaking aspen or bigtooth aspen, singly or in combination, comprise a plurality of the stocking. (Common associates include oak, pine, balsam fir, and paper birch.)

Paper birch.—Forests in which paper birch comprises a plurality of the stocking. (Common associates include maple, aspen, and balsam fir.)

Exotic.—Forests in which species not native to the State comprise a plurality of the stocking. (Mostly Scotch pine plantations.)

Gross area.—The entire area of land and water as determined by the Bureau of the Census, 1970.

Growing-stock trees.—Live trees of commercial species qualifying as desirable and acceptable trees. (Note: Excludes rough, rotten, and dead trees.)

Growing-stock volume.—Net volume in cubic feet of growing-stock trees 5.0 inches d.b.h. and over, from a 1-foot stump to a minimum 4.0 inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs. Cubic feet can be converted to standard cords by dividing by 79 cubic feet per solid wood cord. One standard cord is 128 cubic feet of stacked wood, including air and bark.

Hardwoods.—Dicotyledonous trees, usually broad-leaved and deciduous.

Idle farmland.—Includes former cropland, orchards, improved pastures, and farm sites not tended within the past 2 years and presently less than 16.7 percent stocked with trees.

Improved pasture.—Land currently improved for grazing by cultivating, seeding, irrigating, or clearing of trees or brush and less than 16.7 percent stocked with live trees.

Indian land.—Tribal land held in fee but administered by the Federal Government.

Land area.—A. *Bureau of the Census.* The area of dry land and land temporarily or partly covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than one-eighth of a statute mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

B. *Forest Inventory and Analysis.* The same as the Bureau of the Census, except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

Live trees.—Growing-stock, rough, and rotten trees 1 inch d.b.h. and larger.

Log grades.—A classification of logs based on external characteristics as indicators of quality or value. (See Appendix for specific grading factors used.)

Logging residues.—The unused growing stock portions of trees cut or killed by logging.

Maintained road.—Any road, hard-topped or other surfaces, that is plowed or graded at least once a year. Includes rights-of-way that are cut or treated to limit herbaceous growth.

Marsh.—Nonforest land that characteristically supports low, generally herbaceous or shrubby vegetation and that is intermittently covered with water.

Merchantable.—Refers to a pulpwood or saw log section that meets pulpwood or saw log specifications, respectively.

Miscellaneous federal land.—Federal land other than National Forest, land administered by the Bureau of Land Management, and Indian land.

Miscellaneous private land.—Privately owned land other than forest-industry and farmer-owned land.

Mortality.—The volume of sound wood in growing-stock and sawtimber trees that die annually.

National Forest land.—Federal land that has been legally designated as National Forest or purchase units, and other land administered by the USDA Forest Service.

Net annual growth of growing-stock.—The annual change in volume of sound wood in live sawtimber and poletimber trees and the total volume of trees entering these classes through ingrowth, less volume losses resulting from natural causes.

Net annual growth of sawtimber.—The annual change in the volume of live sawtimber trees and the total volume of trees reaching sawtimber size, less volume losses resulting from natural causes.

Net volume.—Gross volume less deductions for rot, sweep, or other defect affecting use for timber products.

Noncommercial forest land.—(a) Unproductive forest land and (b) productive-reserved forest land.

Noncommercial species.—Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land.—Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide and more than 1 acre in area to qualify as nonforest land.)

a. *Nonforest land without trees.*—Nonforest land with no live trees present.

b. *Nonforest land with trees.*—Nonforest land with one or more trees per acre at least 5 inches d.b.h.

Nonstocked land.—Commercial forest land less than 16.7 percent stocked with growing-stock trees.

Other removals.—Growing-stock trees removed but not utilized for products, or trees left standing but "removed" from the commercial forest land classification by land use change. Examples are removals from cultural operations such as timber stand improvement work, land clearing, and changes in land use.

Ownership.—Property owned by one owner, regardless of the number of parcels in a specified area.

Ownership size class.—The amount of commercial forest land owned by one owner, regardless of the number of parcels.

Owner tenure.—The length of time a property has been held by the owner.

Physiographic class.—A measure of soil and water conditions that affect tree growth on a site. The physiographic classes are:

Xeric sites.—Very dry soils where excessive drainage seriously limits both growth and species occurrence. Example: sandy jack pine plains.

Xeromesic sites.—Moderately dry soils where excessive drainage limits growth and species occurrence to some extent. Example: dry oak ridge.

Mesic sites.—Deep, well-drained soils. Growth and species occurrence are limited only by climate.

Hydromesic sites.—Moderately wet soils where insufficient drainage or infrequent flooding limits growth and species occurrence to some extent. Example: better drained bottomland hardwood sites.

Hydric sites.—Very wet sites where excess water seriously limits both growth and species occurrence. Example: frequently flooded river bottoms and spruce bogs.

Plant byproducts.—Plant residues used for products such as mulch, pulp chips, and fuelwood.

Plant residues.—Wood and bark materials generated at manufacturing plants during production of other products.

Poletimber stands.—(See stand-size class.)

Poletimber trees.—Growing-stock trees of commercial species at least 5.0 inches d.b.h. but smaller than sawtimber size.

Productive-reserved forest land.—Forest land sufficiently productive to qualify as commercial forest land but withdrawn from timber utilization through statute, administration regulation, designation, or exclusive use for Christmas tree production, as indicated by annual shearing.

Productive-deferred.—Forest land sufficiently productive to qualify as commercial forest land but presently withdrawn from timber utilization because it is being considered for possible inclusion into the Wilderness system.

Rotten trees.—Live trees of commercial species that do not contain at least one 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, and/or do not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of extra cull volume in a tree is rotten.

Rough trees.—(a) Live trees of commercial species that do not contain at least one merchantable 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, and/or do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Roundwood products.—Logs, bolts, or other round sections (including chips from roundwood) cut from trees for industrial or consumer uses. (Note: Includes saw logs, veneer logs and bolts; cooperage logs and bolts; pulpwood; fuelwood; piling; poles; posts; hewn ties; mine timbers; and various other round, split, or hewn products.)

Salvable dead trees.—Standing or down dead trees considered merchantable by regional standards.

Saplings.—Live trees 1.0 to 5.0 inches d.b.h.

Sapling-seedling stands.—(See stand-size class.)

Saw log.—A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter outside bark (d.o.b.) for softwoods of 7 inches (9 inches for hardwoods) or other combinations of size and defect specified by regional standards.

Saw log portion.—That part of the bole of sawtimber trees between the stump and the saw log top.

Saw log top.—The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw log top is 7.0 inches d.o.b. for softwoods and 9.0 inches d.o.b. for hardwoods.

Sawtimber stands.—(See stand-size class.)

Sawtimber trees.—Growing-stock trees of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting regional specifications for freedom from defect. Softwoods must be at least 9.0 inches d.b.h. Hardwoods must be at least 11.0 inches d.b.h.

Sawtimber volume.—Net volume of the saw log portion of live sawtimber in board feet, International ¼-inch rule, from stump to a minimum 7 inches top diameter outside bark (d.o.b.) for softwoods and a minimum 9 inches top d.o.b. for hardwoods.

Seedlings.—Live trees less than 1.0 inch d.b.h. that are expected to survive. Only softwood seedlings more than 6 inches tall and hardwood seedlings more than 1 foot tall are counted.

Short-log (rough tree).—Sawtimber-size trees of commercial species that contain at least one merchantable 8- to 11-foot saw log but not a 12-foot saw log or two noncontiguious saw logs 8- to 11- feet long.

Shrub biomass.—The total above-ground weight (including the bark) of selected shrubs and trees less than 1 inch d.b.h.

Site class.—A classification of forest land in terms of inherent capacity to grow crops of industrial wood based on fully stocked natural stands.

Site index.—An expression of forest site quality based on the height of a free-growing dominant or codominant tree of a representative species in the forest type at age 50.

Softwoods.—Coniferous trees, usually evergreen, having needles or scale-like leaves.

Stand.—A growth of trees on a minimum of 1 acre of forest land that is stocked by forest trees of any size.

Stand-age class.—Age of the main stand. Main stand refers to trees of the dominant forest type and stand-size class.

Stand-area class.—The extent of a continuous forested area of the same forest type, stand-size class, and stand-density class.

Stand-size class.—A classification of forest land based on the size class of growing-stock trees on the area; that is, sawtimber, poletimber, or seedlings and saplings.

a. *Sawtimber stands.*—Stands at least 16.7 percent stocked with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

b. *Poletimber stands.*—Stands at least 16.7 percent stocked with growing-stock trees of which half or more of this stocking is in poletimber and/or sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

c. *Sapling-seedling stands.*—Stands at least 16.7 percent stocked with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

d. *Nonstocked stands.*—Stands in which stocking of growing-stock trees is less than 16.7 percent.

State land.—Land either owned by States or leased to them for 50 years or more.

Stocking.—The degree of occupancy of land by trees, measured by basal area and/or the number of trees in a stand by size or age and spacing, compared to the basal area and/or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

A stocking percent of 100 indicates full utilization of the site and is equivalent to 80 square feet of basal area per acre in trees 5 inches d.b.h. and larger. In a stand of trees less than 5 inches d.b.h., a stocking percent of 100 would indicate that the present number of trees is sufficient to produce 80 square feet of basal area per acre when the trees reach 5 inches d.b.h.

Stands are grouped into the following stocking classes:

Overstocked stands.—Stands in which stocking of trees is 134.0 percent or more.

Fully stocked stands.—Stands in which stocking of trees is from 101.0 to 133.9 percent.

Medium stocked stands.—Stands in which stocking of trees is from 61.0 to 100.9 percent.

Poorly stocked stands.—Stands in which stocking of trees is from 16.7 to 60.9 percent.

Nonstocked areas.—Commercial forest land on which stocking of trees is less than 16.7 percent.

Timber removals from growing stock.—The volume of sound wood in growing-stock trees removed annually for forest products (including roundwood products and logging residues) and for other removals.

Timber removals from sawtimber.—The net board-foot volume of live sawtimber trees removed for forest products annually (including roundwood products and logging residues) and for other removals.

Timber products output.—All timber products cut from roundwood and byproducts of wood manufacturing plants. Roundwood products include logs, bolts, or other round sections cut from growing-stock trees, cull trees, salvable dead trees, trees on nonforest land, noncommercial species, sapling-size trees, and limbwood. Byproducts from primary manufacturing plants include slabs, edging, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and screenings of pulpmills that are used as pulpwood chips or other products.

Tree biomass.—The total aboveground weight (including the bark) of all trees from 1 to 5 inches in d.b.h., and the total aboveground weight (including the bark) from a 1-foot stump for trees more than 5 inches in diameter.

Tree size class.—A classification of trees based o diameter at breast height, including sawtimbe trees, poletimber trees, saplings, and seedlings.

Unproductive forest land.—Forest land incapabl of producing 20 cubic feet per acre of annua growth or of yielding crops of industrial woo under natural conditions because of adverse sit conditions. (Note: Adverse conditions include shallo soil, dry climate, poor drainage, high elevatio steepness, and rockiness).

Upper stem portion.—That part of the bole of saw timber trees above the saw log top to a minimur top diameter of 4.0 inches outside bark or to th point where the central stem breaks into limbs.

Urban and other areas.—Areas within the leg boundaries of cities and towns; suburban area developed for residential, industrial, or recreation purposes; schoolyards, cemeteries, roads; railroad airports; beaches; powerlines; and other rights-o way; or other nonforest land not included in an other specified land use class.

Water—(a) *Bureau of the Census.*—Permanent inlan water surfaces, such as lakes, reservoirs, and pon having at least 40 acres in area; and stream sloughs, estuaries, and canals at least one-eighth a statute mile wide.

(b) *Noncensus.*—Permanent inland water su faces, such as lakes, reservoirs, and ponds from 39.9 acres in area; and streams, sloughs estuarie and canals from 120 feet to one-eighth of a statu mile wide.

Wooded pasture.—Improved pasture with more tha 16.7 percent stocking in live trees but less than 2 percent stocking in growing-stock trees. Area currently improved for grazing or there is oth evidence of grazing.

Wooded strip.—An acre or more of natural contin ous forest land that would otherwise meet surv standards for commercial forest land except that is less than 120 feet wide.

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Table 1.--Area of land by land class, Northwest Unit, Wisconsin, 1968 and 1983

(In thousand acres)

Land class	1968	1983
Forest land		
Commercial forest land		
Jack pine	319.4	247.8
Red pine	91.8	132.6
White pine	45.7	36.5
Balsam fir	260.4	219.6
White spruce	38.1	31.9
Black spruce	94.8	111.2
Northern white-cedar	74.0	107.8
Tamarack	101.5	111.5
Oak-hickory	443.5	415.6
Elm-ash-soft maple	419.7	414.9
Maple-birch	1,380.5	1,478.7
Aspen	1,604.4	1,508.3
Paper birch	240.3	268.8
Nonstocked	132.3	65.6
Subtotal	5,246.4	5,150.8
Noncommercial forest land		
Unproductive	178.9	165.8
Productive-reserved	5.5	114.6
Subtotal	184.4	280.4
Total	5,430.8	5,431.2
Nonforest land		
Cropland	1,043.0	1,275.2
Pasture and range	243.2	345.4
Other	1,220.5	876.5
Total	2,506.7	2,497.1
Total land	7,937.5	7,928.3
Water (Bureau of the Census)	282.0[1/]	291.0[2/]
Total land and water	8,219.5[1/]	8,219.3[2/]

[1/] U.S. Department of Commerce, Bureau of Census, 1960.

[2/] U.S. Department of Commerce, Bureau of Census, 1980.

Table 2.--Area of land by land use class and county, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Land use class	All counties	County					
		Ashland	Barron	Bayfield	Burnett	Douglas	Iron
Forest land							
Commercial forest	5,150.8	503.8	158.7	740.5	317.1	627.9	377.9
Unproductive forest	165.8	26.6	7.0	14.3	1.9	9.6	17.3
Productive reserved	114.6	38.7	--	25.3	16.9	2.8	4.9
Total	5,431.2	569.1	165.7	780.1	335.9	640.3	400.1
Nonforest land							
Nonforest with trees							
Cropland with trees	12.6	--	4.7	--	--	1.9	--
Improved pasture with trees	60.1	--	17.6	2.1	--	3.9	4.3
Wooded strips	8.1	4.0	-	--	--	--	--
Idle farmland with trees	16.0	4.0	2.3	--	--	--	4.2
Marsh with trees	90.6	4.0	9.2	10.7	3.8	16.9	3.6
Urban and other windbreaks	56.9	2.1	12.8	5.6	3.5	4.5	--
Windbreaks	10.6	--	2.3	--	--	--	--
Wooded pasture	30.3	2.0	4.6	1.8	1.9	--	--
Subtotal	285.2	16.1	53.5	20.2	9.2	27.2	12.1
Nonforest without trees							
Cropland without trees	1,262.6	45.8	260.8	68.4	97.1	69.3	25.4
Improved pasture without trees	255.0	20.1	25.2	15.8	3.7	18.6	30.1
Idle farm without trees	14.6	2.1	--	4.0	--	--	--
Marsh without trees	374.2	12.5	10.6	11.5	64.0	42.0	--
Other farm-farmstead	23.2	--	--	1.9	--	--	--
Urban and other	269.2	7.3	36.3	32.9	12.0	37.2	13.9
Noncensus water	13.1	1.9	3.4	2.0	--	1.9	--
Subtotal	2,211.9	89.7	336.3	136.5	176.8	169.0	69.4
Total	2,497.1	105.8	389.8	156.7	186.0	196.2	81.5
Total land	7,928.3	674.9	555.5	936.8	521.9	836.5	481.6
Water (Bureau of the Census)[1/]	291.0	1.7	13.6	32.1	41.6	23.8	33.2
Total land and water[1/]	8,219.3	676.6	569.1	968.9	563.5	860.3	514.8

(Table 2 continued on next page)

[1/] U.S. Department of Commerce, Bureau of Census, 1980.

(Table 2 continued)

Land use class	County					
	Polk	Price	Rusk	Sawyer	Taylor	Washburn
Forest land						
Commercial forest	220.8	550.8	363.1	607.7	354.4	328.1
Unproductive forest	3.8	41.3	6.0	21.0	13.6	3.4
Productive reserved	5.4	6.3	4.1	10.2	--	--
Total	230.0	598.4	373.2	638.9	368.0	331.5
Nonforest land						
Nonforest with trees						
Cropland with trees	2.0	--	--	--	4.0	--
Improved pasture with trees	3.2	7.8	4.3	--	9.6	7.3
Wooded strips	--	--	--	--	--	4.1
Idle farmland with trees	1.8	--	2.0	--	--	1.7
Marsh with trees	7.3	13.2	--	3.5	9.2	9.2
Urban and other windbreaks	5.5	2.9	--	9.2	--	10.8
Windbreaks	--	--	--	8.3	--	--
Wooded pasture	13.0	--	1.9	--	1.7	3.4
Subtotal	32.8	23.9	8.2	21.0	24.5	36.5
Nonforest without trees						
Cropland without trees	266.3	88.5	101.7	41.5	120.8	77.0
Improved pasture without trees	17.5	14.7	21.5	12.4	57.8	17.6
Idle farm without trees	1.8	--	--	--	--	6.7
Marsh without trees	18.1	57.4	49.0	50.5	22.1	36.5
Other farm-farmstead	3.6	2.1	5.2	4.2	1.8	4.4
Urban and other	15.4	20.4	25.3	31.3	26.2	11.0
Noncensus water	1.8	--	--	2.1	--	--
Subtotal	324.5	183.1	202.7	142.0	228.7	153.2
Total	357.3	207.0	210.9	163.0	253.2	189.7
Total land	587.3	805.4	584.1	801.9	621.2	521.2
Water (Bureau of the Census)[1/]	25.6	14.5	11.1	60.7	7.6	25.5
Total land and water[1/]	612.9	819.9	595.2	862.6	628.8	546.7

[1/] U.S. Department of Commerce, Bureau of Census, 1980.

Table 3.--Area of commercial forest land by ownership class and county, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All counties	County					
		Ashland	Barron	Bayfield	Burnett	Douglas	Iron
National Forest	693.5	143.3	--	238.7	--	--	--
Miscellaneous federal	7.3	--	--	--	5.6	--	--
State	176.8	10.0	6.9	8.8	26.5	32.4	19.2
County and municipal	1,109.8	40.6	16.1	160.6	100.2	253.8	141.7
Indian	94.6	38.5	--	7.2	--	--	10.5
Forest industry	529.2	42.3	--	89.2	7.6	99.4	80.7
Farmer	450.2	26.5	55.2	41.3	45.3	30.5	10.5
Misc. private-corporation	224.0	46.7	6.9	17.8	5.6	28.5	24.5
Misc. private-individual	1,865.4	155.9	73.6	176.9	126.3	183.3	90.8
All owners	5,150.8	503.8	158.7	740.5	317.1	627.9	377.9

(Table 3 continued)

(Table 3 continued)

Ownership class	County					
	Polk	Price	Rusk	Sawyer	Taylor	Washburn
National Forest	--	105.2	--	99.0	107.3	--
Miscellaneous federal	--	--	--	1.7	--	--
State	5.7	17.9	6.0	33.0	5.3	5.1
County and municipal	24.4	64.4	79.6	100.5	8.9	119.0
Indian	--	--	--	38.4	--	--
Forest industry	--	39.3	51.6	98.2	9.0	11.9
Farmer	66.7	15.9	83.0	7.0	39.4	28.9
Misc. private-corporation	14.7	21.5	3.9	28.2	3.6	22.1
Misc. private-individual	109.3	286.6	139.0	201.7	180.9	141.1
All owners	220.8	550.8	363.1	607.7	354.4	328.1

Table 4.--Area of commercial forest land by ownership class and site class, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
National Forest	693.5	--	--	17.9	211.9	335.3	128.4
Miscellaneous federal	7.3	--	--	-	3.5	-	3.8
State	176.8	--	--	5.6	43.6	63.1	64.5
County and municipal	1,109.8	--	--	20.9	227.0	502.3	359.6
Indian	94.6	--	--	3.7	29.5	52.4	9.0
Forest industry	529.2	--	--	3.6	91.8	199.6	234.2
Farmer	450.2	--	--	20.9	118.5	209.1	101.7
Misc. private-corporation	224.0	--	--	5.6	52.9	93.2	72.3
Misc. private-individual	1,865.4	--	--	42.8	430.4	832.8	559.4
All owners	5,150.8	--	--	121.0	1,209.1	2,287.8	1,532.9

Table 5.--Area of commercial forest land by ownership class and stand-volume class, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All classes	Stand-volume class (board feet[1/])		
		Less than 1,500	1,500 to 5,000	5,000+
National Forest	693.5	287.6	320.4	85.5
Miscellaneous federal	7.3	5.4	1.9	--
State	176.8	85.3	76.0	15.5
County and municipal	1,109.8	545.2	451.9	112.7
Indian	94.6	28.8	33.3	32.5
Forest industry	529.2	285.5	189.0	54.7
Farmer	450.2	234.0	170.2	46.0
Misc. private-corporation	224.0	94.5	90.3	39.2
Misc. private-individual	1,865.4	951.2	713.8	200.4
All owners	5,150.8	2,517.5	2,046.8	586.5

[1/] International 1/4-inch rule.

Table 6.--Area of privately owned commercial forest land by ownership class, owner tenure, and size of holding, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Ownership class and owner tenure class	All sizes	Size of holding (acres)								
		1-4	5-10	11-20	21-50	51-100	101-500	501-2,500	2,501-5,000	5001+
Forest industry										
1-4 years	37.0	--	--	--	--	3.5	1.9	--	1.8	29.8
5-9 years	60.8	--	--	--	--	--	2.0	--	-	58.8
10-19 years	187.0	--	--	--	--	--	2.0	7.5	7.1	170.4
20+ years	244.4	--	--	--	--	--	--	1.9	5.3	237.2
All classes	529.2	--	--	--	--	3.5	5.9	9.4	14.2	496.2
Farmer										
1-4 years	89.4	--	5.9	11.7	23.6	19.2	25.6	3.4	--	--
5-9 years	82.6	--	5.6	7.4	16.2	17.0	30.6	5.8	--	--
10-19 years	149.4	--	7.6	7.6	37.1	31.7	63.5	1.9	--	--
20+ years	128.8	3.7	11.6	13.6	23.8	31.8	44.3	--	--	--
All classes	450.2	3.7	30.7	40.3	100.7	99.7	164.0	11.1	--	--
Misc. priv.-corporation										
1-4 years	47.4	--	--	--	1.8	5.9	13.5	1.7	1.8	22.7
5-9 years	25.1	--	--	--	1.8	1.8	7.1	5.3	1.7	7.4
10-19 years	48.2	--	--	--	5.7	7.6	13.0	9.3	3.4	9.2
20+ years	103.3	--	--	--	5.5	8.0	25.0	25.5	17.7	21.6
All classes	224.0	--	--	--	14.8	23.3	58.6	41.8	24.6	60.9
Misc. priv.-individual										
1-4 years	544.4	9.4	15.8	24.9	181.3	153.8	153.6	3.8	1.8	--
5-9 years	409.2	11.2	12.8	22.0	140.1	101.9	115.8	5.4	--	--
10-19 years	502.1	8.6	9.5	18.9	151.1	113.0	179.5	21.5	--	--
20+ years	409.7	3.9	5.7	15.3	110.3	111.0	140.0	23.5	--	--
All classes	1,865.4	33.1	43.8	81.1	582.8	479.7	588.9	54.2	1.8	--
All private owners										
1-4 years	718.2	9.4	21.7	36.6	206.7	182.4	194.6	8.9	5.4	52.5
5-9 years	577.7	11.2	18.4	29.4	158.1	120.7	155.5	16.5	1.7	66.2
10-19 years	886.7	8.6	17.1	26.5	193.9	152.3	258.0	40.2	10.5	179.6
20+ years	886.2	7.6	17.3	28.9	139.6	150.8	209.3	50.9	23.0	258.8
All classes	3,068.8	36.8	74.5	121.4	698.3	606.2	817.4	116.5	40.6	557.1

Table 7.--Area of commercial forest land by forest type, stand-size class, and ownership class, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All owners	Ownership class								
		National Forest[1/]	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Jack pine										
Sawtimber	36.4	3.0	--	1.9	7.3	--	7.4	1.8	4.2	10.8
Poletimber	142.0	36.4	--	1.9	46.5	--	26.4	7.3	-	23.5
Sapling & seedling	69.4	--	--	3.8	31.3	--	11.1	1.7	1.7	19.8
All stands	247.8	39.4	--	7.6	85.1	--	44.9	10.8	5.9	54.1
Red pine										
Sawtimber	53.3	29.2	--	--	5.4	3.8	3.7	2.0	3.6	5.6
Poletimber	28.9	6.8	--	--	13.4	1.7	--	--	1.7	5.3
Sapling & seedling	50.4	21.0	--	1.9	14.3	--	9.4	1.9	1.9	--
All stands	132.6	57.0	--	1.9	33.1	5.5	13.1	3.9	7.2	10.9
White pine										
Sawtimber	30.8	7.3	--	--	7.4	3.4	5.5	--	--	7.2
Poletimber	5.7	--	--	--	1.7	--	--	--	--	4.0
Sapling & seedling	--	--	--	--	--	--	--	--	--	--
All stands	36.5	7.3	--	--	9.1	3.4	5.5	--	--	11.2
Balsam fir										
Sawtimber	79.7	18.6	--	3.5	18.1	2.0	5.5	11.2	--	20.8
Poletimber	92.7	15.9	--	7.5	14.7	2.1	7.1	3.9	3.9	37.6
Sapling & seedling	47.2	2.8	--	-	7.4	--	5.3	5.7	2.0	24.0
All stands	219.6	37.3	--	11.0	40.2	4.1	17.9	20.8	5.9	82.4
White spruce										
Sawtimber	13.7	10.0	--	--	--	--	2.0	--	--	1.7
Poletimber	12.5	8.7	--	--	--	--	--	--	2.1	1.7
Sapling & seedling	5.7	--	--	1.7	--	--	2.0	--	--	2.0
All stands	31.9	18.7	--	1.7	--	--	4.0	--	2.1	5.4
Black spruce										
Sawtimber	1.8	--	--	--	--	--	--	--	--	1.8
Poletimber	27.8	--	--	--	9.3	--	5.5	--	--	13.0
Sapling & seedling	81.6	18.8	--	1.7	12.7	--	9.0	4.3	1.9	33.2
All stands	111.2	18.8	--	1.7	22.0	--	14.5	4.3	1.9	48.0
Northern white-cedar										
Sawtimber	44.7	4.8	--	3.8	14.1	1.8	7.3	--	1.8	11.1
Poletimber	55.4	25.1	--	1.7	8.6	--	3.6	--	--	16.4
Sapling & seedling	7.7	0.7	--	--	1.7	--	1.8	--	1.8	1.7
All stands	107.8	30.6	--	5.5	24.4	1.8	12.7	--	3.6	29.2

(Table 7 continued on next page)

[1/] Northern white-cedar and tamarack forest types are classified as mixed swamp conifer on the Chequamegon National Forest management plan.

(Table 7 continued)

Forest type and stand-size class	All owners	Ownership class: National Forest[1/]	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Tamarack										
Sawtimber	9.3	--	--	--	--	--	2.0	1.8	1.8	3.7
Poletimber	40.5	11.5	--	3.5	5.4	--	1.8	--	--	18.3
Sapling & seedling	61.7	1.4	--	1.8	7.4	--	7.1	9.4	3.7	30.9
All stands	111.5	12.9	--	5.3	12.8	--	10.9	11.2	5.5	52.9
Oak-hickory										
Sawtimber	120.1	--	--	1.9	13.8	1.8	3.7	27.5	12.0	59.4
Poletimber	178.2	32.2	--	8.0	40.3	1.7	5.6	15.9	7.2	67.3
Sapling & seedling	117.3	2.3	--	5.7	29.9	--	37.4	4.2	--	37.8
All stands	415.6	34.5	--	15.6	84.0	3.5	46.7	47.6	19.2	164.5
Elm-ash-soft maple										
Sawtimber	107.9	1.4	--	7.0	27.9	--	12.6	16.3	3.6	39.1
Poletimber	215.4	17.6	--	3.5	59.0	2.1	28.8	18.5	7.2	78.7
Sapling & seedling	91.6	3.4	--	1.8	16.3	1.8	11.1	7.5	1.9	47.8
All stands	414.9	22.4	--	12.3	103.2	3.9	52.5	42.3	12.7	165.6
Maple-birch										
Sawtimber	451.6	49.7	--	20.0	92.1	16.2	62.5	35.1	22.3	153.7
Poletimber	816.5	154.6	--	19.7	164.0	7.5	94.2	54.4	40.8	281.3
Sapling & seedling	210.6	2.5	--	3.9	36.2	3.4	29.2	21.1	7.5	106.8
All stands	1,478.7	206.8	--	43.6	292.3	27.1	185.9	110.6	70.6	541.8
Aspen										
Sawtimber	176.7	1.4	--	9.3	37.2	11.3	11.2	24.1	11.0	71.2
Poletimber	771.1	85.3	--	20.6	156.7	22.0	48.0	94.4	40.4	303.7
Sapling & seedling	560.5	94.1	3.5	28.3	140.5	10.0	30.2	51.1	16.5	186.3
All stands	1,508.3	180.8	3.5	58.2	334.4	43.3	89.4	169.6	67.9	561.2
Paper birch										
Sawtimber	26.5	--	--	--	3.7	--	1.9	1.8	1.7	17.4
Poletimber	198.8	21.7	3.8	5.3	45.3	2.0	18.4	17.4	16.3	68.6
Sapling & seedling	43.5	5.3	--	1.8	5.7	--	1.8	5.6	--	23.3
All stands	268.8	27.0	3.8	7.1	54.7	2.0	22.1	24.8	18.0	109.3
Exotic										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--
Nonstocked	65.6	--	--	5.3	14.5	--	9.1	4.3	3.5	28.9
All types										
Sawtimber	1,152.5	125.4	--	47.4	227.0	40.3	125.3	121.6	62.0	403.5
Poletimber	2,585.5	415.8	3.8	71.7	564.9	39.1	239.4	211.8	119.6	919.4
Sapling & seedling	1,347.2	152.3	3.5	52.4	303.4	15.2	155.4	112.5	38.9	513.6
Nonstocked	65.6	--	--	5.3	14.5	--	9.1	4.3	3.5	28.9
All stands	5,150.8	693.5	7.3	176.8	1,109.8	94.6	529.2	450.2	224.0	1,865.4

[1/] Northern white-cedar and tamarack forest types are classified as mixed swamp conifer on the Chequamegon National Forest management plan.

Table 8.--Area of commercial forest land by forest type and county, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All counties	County					
		Ashland	Barron	Bayfield	Burnett	Douglas	Iron
Jack pine	247.8	0.7	2.3	58.1	54.6	74.2	--
Red pine	132.6	9.5	--	54.4	10.0	17.2	5.3
White pine	36.5	2.0	--	10.9	1.9	1.9	--
Balsam fir	219.6	52.0	--	20.8	--	44.0	35.1
White spruce	31.9	14.7	--	--	--	--	1.7
Black spruce	111.2	13.9	2.3	7.1	3.8	17.1	12.4
Northern white-cedar	107.8	22.7	--	5.4	--	5.7	38.3
Tamarack	111.5	13.4	2.3	6.2	5.7	9.5	3.6
Oak-hickory	415.6	2.0	46.0	66.8	79.0	59.4	5.2
Elm-ash-soft maple	414.9	26.9	9.2	33.6	29.2	57.2	27.9
Maple-birch	1,478.7	187.8	34.5	167.3	21.6	74.3	159.3
Aspen	1,508.3	138.1	46.0	253.7	90.4	208.4	71.8
Paper birch	268.8	20.1	13.8	54.4	13.3	49.6	17.3
Exotic	--	--	--	--	--	--	--
Nonstocked	65.6	--	2.3	1.8	7.6	9.4	--
All types	5,150.8	503.8	158.7	740.5	317.1	627.9	377.9

(Table 8 continued)

(Table 8 continued)

Forest type	County					
	Polk	Price	Rusk	Sawyer	Taylor	Washburn
Jack pine	13.2	2.2	--	1.7	--	40.8
Red pine	--	12.0	3.9	13.4	1.8	5.1
White pine	--	--	6.0	12.1	--	1.7
Balsam fir	--	41.8	2.0	15.4	8.5	--
White spruce	--	3.1	--	8.8	3.6	--
Black spruce	--	14.6	10.0	20.4	6.2	3.4
Northern white-cedar	--	17.4	2.0	9.4	3.5	3.4
Tamarack	5.4	28.5	2.0	10.2	14.5	10.2
Oak-hickory	66.9	--	18.0	26.4	--	45.9
Elm-ash-soft maple	14.9	60.5	43.8	45.4	42.5	23.8
Maple-birch	59.2	174.4	132.9	249.1	163.9	54.4
Aspen	53.9	166.2	120.7	151.6	83.4	124.1
Paper birch	7.3	17.6	17.8	28.3	15.7	13.6
Exotic	--	--	--	--	--	--
Nonstocked	--	12.5	4.0	15.5	10.8	1.7
All types	220.8	550.8	363.1	607.7	354.4	328.1

Table 9.--Area of commercial forest land by county and stand-size class, Northwest Unit, Wisconsin, 1983

(In thousand acres)

County	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Ashland	503.8	135.9	263.6	104.3	--
Barron	158.7	57.5	64.4	34.5	2.3
Bayfield	740.5	144.0	407.2	187.5	1.8
Burnett	317.1	74.5	133.3	101.7	7.6
Douglas	627.9	106.5	301.7	210.3	9.4
Iron	377.9	108.5	192.0	77.4	--
Polk	220.8	64.7	98.4	57.7	--
Price	550.8	97.9	256.6	183.8	12.5
Rusk	363.1	103.0	192.4	63.7	4.0
Sawyer	607.7	162.1	312.9	117.2	15.5
Taylor	354.4	52.0	179.4	112.2	10.8
Washburn	328.1	45.9	183.6	96.9	1.7
All counties	5,150.8	1,152.5	2,585.5	1,347.2	65.6

Table 10.--Area of commercial forest land by forest type, stand-size class, and site class, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
Jack pine							
Sawtimber	36.4	--	--	--	7.0	16.6	12.8
Poletimber	142.0	--	--	--	5.7	75.2	61.1
Sapling & seedling	69.4	--	--	1.9	3.6	29.3	34.6
All stands	247.8	--	--	1.9	16.3	121.1	108.5
Red pine							
Sawtimber	53.3	--	--	8.4	37.5	7.4	--
Poletimber	28.9	--	--	3.5	23.6	1.8	--
Sapling & seedling	50.4	--	--	1.9	11.1	29.4	8.0
All stands	132.6	--	--	13.8	72.2	38.6	8.0
White pine							
Sawtimber	30.8	--	--	3.4	9.1	16.6	1.7
Poletimber	5.7	--	--	--	--	3.7	2.0
Sapling & seedling	--	--	--	--	--	--	--
All stands	36.5	--	--	3.4	9.1	20.3	3.7
Balsam fir							
Sawtimber	79.7	--	--	38.6	19.8	14.3	7.0
Poletimber	92.7	--	--	19.0	42.3	22.1	9.3
Sapling & seedling	47.2	--	--	15.8	11.2	12.9	7.3
All stands	219.6	--	--	73.4	73.3	49.3	23.6
White spruce							
Sawtimber	13.7	--	--	--	13.7	--	--
Poletimber	12.5	--	--	--	8.7	3.8	--
Sapling & seedling	5.7	--	--	--	2.0	2.0	1.7
All stands	31.9	--	--	--	24.4	5.8	1.7
Black spruce							
Sawtimber	1.8	--	--	--	--	1.8	--
Poletimber	27.8	--	--	--	3.5	--	24.3
Sapling & seedling	81.6	--	--	--	1.3	2.0	78.3
All stands	111.2	--	--	--	4.8	3.8	102.6
Northern white-cedar							
Sawtimber	44.7	--	--	--	--	15.8	28.9
Poletimber	55.4	--	--	--	--	10.8	44.6
Sapling & seedling	7.7	--	--	--	--	--	7.7
All stands	107.8	--	--	--	--	26.6	81.2

(Table 10 continued on next page)

(Table 10 continued)

Forest type and stand-size class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
Tamarack							
Sawtimber	9.3	--	--	--	1.9	3.6	3.8
Poletimber	40.5	--	--	--	1.7	16.9	21.9
Sapling & seedling	61.7	--	--	--	1.7	18.5	41.5
All stands	111.5	--	--	--	5.3	39.0	67.2
Oak-hickory							
Sawtimber	120.1	--	--	--	14.0	79.2	26.9
Poletimber	178.2	--	--	--	30.2	117.3	30.7
Sapling & seedling	117.3	--	--	--	10.2	55.3	51.8
All stands	415.6	--	--	--	54.4	251.8	109.4
Elm-ash-soft maple							
Sawtimber	107.9	--	--	--	5.8	15.8	86.3
Poletimber	215.4	--	--	--	13.9	50.7	150.8
Sapling & seedling	91.6	--	--	--	1.8	9.6	80.2
All stands	414.9	--	--	--	21.5	76.1	317.3
Maple-birch							
Sawtimber	451.6	--	--	--	78.3	237.0	136.3
Poletimber	816.5	--	--	1.8	127.6	453.2	233.9
Sapling & seedling	210.6	--	--	--	20.5	113.0	77.1
All stands	1,478.7	--	--	1.8	226.4	803.2	447.3
Aspen							
Sawtimber	176.7	--	--	7.2	78.6	85.6	5.3
Poletimber	771.1	--	--	11.7	371.1	357.2	31.1
Sapling & seedling	560.5	--	--	5.9	218.4	254.5	81.7
All stands	1,508.3	--	--	24.8	668.1	697.3	118.1
Paper birch							
Sawtimber	26.5	--	--	--	1.8	8.2	16.5
Poletimber	198.8	--	--	1.9	22.4	99.3	75.2
Sapling & seedling	43.5	--	--	--	3.7	16.2	23.6
All stands	268.8	--	--	1.9	27.9	123.7	115.3
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Nonstocked	65.6	--	--	--	5.4	31.2	29.0
All types							
Sawtimber	1,152.5	--	--	57.6	267.5	501.9	325.5
Poletimber	2,585.5	--	--	37.9	650.7	1,212.0	684.9
Sapling & seedling	1,347.2	--	--	25.5	285.5	542.7	493.5
Nonstocked	65.6	--	--	--	5.4	31.2	29.0
All stands	5,150.8	--	--	121.0	1,209.1	2,287.8	1,532.9

Table 11.--Area of commercial forest land by forest type and stand-age class, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	247.8	16.8	29.4	34.1	50.6	83.9	24.0	3.6	3.5	1.9	--	--	--	--
Red pine	132.6	21.2	29.1	10.7	22.9	24.7	10.9	2.0	4.6	3.6	2.9	--	--	--
White pine	36.5	--	--	--	--	3.4	5.7	11.2	10.4	3.9	--	1.9	--	--
Balsam fir	219.6	19.5	13.0	22.6	21.8	27.5	59.1	35.0	3.4	8.9	1.8	3.8	3.2	--
White spruce	31.9	--	3.7	10.7	11.7	3.8	--	2.0	--	--	--	--	--	--
Black spruce	111.2	12.3	11.8	32.4	25.1	15.0	3.9	1.8	5.4	3.5	--	--	--	--
Northern white-cedar	107.8	--	1.8	5.2	0.7	20.6	3.8	14.4	10.1	13.8	13.2	5.3	6.4	12.5
Tamarack	111.5	7.0	27.6	21.8	7.0	16.8	5.4	1.7	7.7	11.0	--	1.9	1.8	1.8
Oak-hickory	415.6	74.6	31.7	11.0	18.5	45.1	106.3	31.4	35.2	23.8	11.8	21.6	4.6	--
Elm-ash-soft maple	414.9	25.3	37.5	33.5	36.2	56.1	49.3	44.6	36.5	29.8	24.2	18.6	16.1	7.2
Maple-birch	1,478.7	76.4	76.8	84.2	91.3	298.8	323.3	217.4	91.5	73.1	54.9	45.5	25.0	20.5
Aspen	1,508.3	249.2	204.6	160.1	230.8	347.7	189.9	83.5	31.7	10.8	--	--	--	--
Paper birch	268.8	12.9	16.6	25.2	44.0	76.6	51.7	30.5	5.6	1.9	--	3.8	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	65.6	65.6	--	--	--	--	--	--	--	--	--	--	--	--
All types	5,150.8	580.8	483.6	451.5	560.6	1,020.0	833.3	479.1	245.6	186.0	108.8	102.4	57.1	42.0

Table 12.--Area of commercial forest land by forest type and site-index class, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All classes	Site-index class (feet)								
		11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91+
Jack pine	247.8	--	--	1.9	36.9	76.8	104.6	21.0	4.7	1.9
Red pine	132.6	--	--	1.8	1.8	30.3	57.1	33.3	8.3	--
White pine	36.5	--	--	--	3.7	20.3	9.1	--	3.4	--
Balsam fir	219.6	3.2	1.7	18.7	60.4	62.2	53.5	11.1	6.8	2.0
White spruce	31.9	--	--	--	1.7	3.8	10.7	15.7	--	--
Black spruce	111.2	--	33.8	47.2	21.6	3.8	4.8	--	--	--
Northern white-cedar	107.8	3.5	32.8	13.9	36.3	8.5	12.8	--	--	--
Tamarack	111.5	--	12.9	23.7	30.6	14.5	24.5	3.6	1.7	--
Oak-hickory	415.6	--	--	12.6	41.6	136.3	115.7	92.0	17.4	--
Elm-ash-soft maple	414.9	--	1.8	33.1	99.5	140.0	75.2	43.8	21.5	--
Maple-birch	1,478.7	--	--	12.5	88.4	346.4	528.9	356.8	129.4	16.3
Aspen	1,508.3	--	--	4.3	54.1	190.3	437.7	550.0	247.1	24.8
Paper birch	268.8	--	--	5.7	20.2	69.5	91.3	52.3	27.9	1.9
Exotic	--	--	--	--	--	--	--	--	--	--
Nonstocked	65.6	--	1.8	5.6	14.5	18.5	14.4	8.9	1.9	--
All types	5,150.8	6.7	84.8	181.0	511.3	1,121.2	1,540.3	1,188.5	470.1	46.9

Table 13.--Area of commercial forest land by forest type, stand-size class, and basal-area class, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	36.4	--	--	--	1.9	1.8	1.8	5.4	8.9	5.6	0.8	8.5	1.7	--	--
Poletimber	142.0	--	--	--	1.9	1.9	9.5	7.6	26.4	13.2	49.8	24.3	5.5	1.9	--
Sapling & seedling	69.4	7.5	--	11.1	11.0	7.4	7.2	3.8	15.8	3.8	1.8	--	--	--	--
All stands	247.8	7.5	--	11.1	14.8	11.1	18.5	16.8	51.1	22.6	52.4	32.8	7.2	1.9	--
Red pine															
Sawtimber	53.3	--	--	--	1.0	2.0	1.9	--	--	1.0	3.7	16.1	11.9	13.7	2.0
Poletimber	28.9	--	--	--	--	--	1.7	1.7	1.9	3.5	2.7	5.1	6.9	5.4	--
Sapling & seedling	50.4	29.3	1.9	3.6	1.9	--	4.5	--	3.6	3.7	--	1.9	--	--	--
All stands	132.6	29.3	1.9	3.6	2.9	2.0	8.1	1.7	5.5	8.2	6.4	23.1	18.8	19.1	2.0
White pine															
Sawtimber	30.8	--	--	--	1.8	--	1.9	--	--	1.7	--	10.9	7.2	7.3	--
Poletimber	5.7	--	--	--	--	--	--	--	--	2.0	--	2.0	1.7	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	36.5	--	--	--	1.8	--	1.9	--	--	3.7	--	12.9	8.9	7.3	--
Balsam fir															
Sawtimber	79.7	--	--	--	--	3.8	16.3	1.9	7.1	3.7	3.6	16.3	21.3	3.7	2.0
Poletimber	92.7	--	--	1.8	--	--	14.6	10.4	1.8	11.5	5.4	13.3	15.6	14.7	3.6
Sapling & seedling	47.2	3.6	7.2	5.5	1.8	3.8	4.6	5.8	9.4	1.9	1.9	--	--	1.7	--
All stands	219.6	3.6	7.2	7.3	1.8	7.6	35.5	18.1	18.3	17.1	10.9	29.6	36.9	20.1	5.6
White spruce															
Sawtimber	13.7	--	--	--	--	--	--	--	--	--	--	--	--	3.7	10.0
Poletimber	12.5	--	--	--	--	--	--	--	--	--	--	--	8.7	3.8	--
Sapling & seedling	5.7	1.7	--	--	--	2.0	2.0	--	--	--	--	--	--	--	--
All stands	31.9	1.7	--	--	--	2.0	2.0	--	--	--	--	--	8.7	7.5	10.0
Black spruce															
Sawtimber	1.8	--	--	--	--	--	--	--	--	--	--	--	1.8	--	--
Poletimber	27.8	--	--	--	--	--	5.8	1.8	11.2	1.7	1.7	1.9	3.7	--	--
Sapling & seedling	81.6	3.4	3.4	12.7	5.5	25.9	5.1	7.0	6.6	5.7	2.0	--	4.3	--	--
All stands	111.2	3.4	3.4	12.7	5.5	25.9	10.9	8.8	17.8	7.4	3.7	1.9	9.8	--	--
Northern white-cedar															
Sawtimber	44.7	--	--	--	--	--	2.0	3.4	3.6	1.8	3.5	--	11.6	9.5	9.3
Poletimber	55.4	--	--	--	--	--	1.8	--	1.8	6.9	--	28.7	8.7	7.5	--
Sapling & seedling	7.7	--	0.7	--	1.8	--	3.5	--	--	--	--	--	--	1.7	--
All stands	107.8	--	0.7	--	1.8	--	7.3	3.4	5.4	8.7	3.5	28.7	20.3	18.7	9.3

(Table 13 continued on next page)

(Table 13 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	9.3	--	1.8	--	--	1.8	2.0	1.8	--	--	--	1.9	--	--	--
Poletimber	40.5	--	--	1.9	--	5.4	5.2	11.4	--	7.5	1.9	5.4	1.8	--	--
Sapling & seedling	61.7	5.1	1.8	13.4	9.1	5.3	12.8	3.5	5.4	1.8	3.5	--	--	--	--
All stands	111.5	5.1	3.6	15.3	9.1	12.5	20.0	16.7	5.4	9.3	5.4	7.3	1.8	--	--
Oak-hickory															
Sawtimber	120.1	--	--	--	6.0	2.3	1.9	15.6	1.9	16.5	6.0	36.9	28.9	4.1	--
Poletimber	178.2	--	--	1.7	--	1.9	5.6	5.2	18.0	24.4	24.2	56.5	20.9	19.8	--
Sapling & seedling	117.3	29.1	14.8	11.7	19.1	24.8	6.4	--	5.4	3.7	--	2.3	--	--	--
All stands	415.6	29.1	14.8	13.4	25.1	29.0	13.9	20.8	25.3	44.6	30.2	95.7	49.8	23.9	--
Elm-ash-soft maple															
Sawtimber	107.9	--	2.3	3.7	3.5	1.9	15.3	3.4	1.9	10.7	2.0	20.7	30.9	11.6	--
Poletimber	215.4	--	--	1.9	7.1	16.4	14.8	11.1	37.2	34.4	26.8	22.5	32.3	9.0	1.9
Sapling & seedling	91.6	8.3	8.0	16.3	7.6	14.6	13.4	3.6	3.5	9.2	5.4	--	1.7	--	--
All stands	414.9	8.3	10.3	21.9	18.2	32.9	43.5	18.1	42.6	54.3	34.2	43.2	64.9	20.6	1.9
Maple-birch															
Sawtimber	451.6	--	--	1.9	2.3	--	9.3	13.5	29.0	31.3	37.8	102.4	146.4	66.2	11.5
Poletimber	816.5	--	--	--	7.3	11.2	20.9	31.1	66.1	97.1	75.6	217.3	205.3	81.1	3.5
Sapling & seedling	210.6	9.2	11.0	20.0	15.5	28.4	30.0	24.0	18.4	16.7	9.4	22.5	3.5	2.0	--
All stands	1,478.7	9.2	11.0	21.9	25.1	39.6	60.2	68.6	113.5	145.1	122.8	342.2	355.2	149.3	15.0
Aspen															
Sawtimber	176.7	--	--	3.9	7.1	11.7	11.4	13.0	17.0	22.5	11.0	21.8	50.4	6.9	--
Poletimber	771.1	--	1.8	13.0	24.1	40.7	75.7	70.3	75.1	117.6	67.1	114.9	124.3	40.5	6.0
Sapling & seedling	560.5	72.1	93.2	69.5	64.5	83.1	60.3	31.1	46.6	23.7	3.6	11.0	1.8	--	--
All stands	1,508.3	72.1	95.0	86.4	95.7	135.5	147.4	114.4	138.7	163.8	81.7	147.7	176.5	47.4	6.0
Paper birch															
Sawtimber	26.5	--	--	--	--	1.9	--	--	3.6	2.3	1.8	7.4	7.7	1.8	--
Poletimber	198.8	--	--	1.9	6.2	3.7	27.1	5.6	9.4	10.8	23.4	39.3	53.1	14.5	3.8
Sapling & seedling	43.5	1.8	--	3.7	4.0	8.7	9.3	5.2	1.8	1.9	3.6	3.5	--	--	--
All stands	268.8	1.8	--	5.6	10.2	14.3	36.4	10.8	14.8	15.0	28.8	50.2	60.8	16.3	3.8
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	65.6	38.8	8.8	3.6	5.5	1.7	3.6	1.9	--	--	1.7	--	--	--	--
All types															
Sawtimber	1,152.5	--	4.1	9.5	23.6	27.2	63.8	58.0	73.0	97.1	70.2	242.9	319.8	128.5	34.8
Poletimber	2,585.5	--	1.8	22.2	46.6	81.2	182.7	156.2	248.9	330.6	278.6	531.2	488.5	198.2	18.8
Sapling & seedling	1,347.2	171.1	142.0	167.5	141.8	204.0	159.1	84.0	116.5	72.1	31.2	41.2	11.3	5.4	--
Nonstocked	65.6	38.8	8.8	3.6	5.5	1.7	3.6	1.9	--	--	1.7	--	--	--	--
All stands	5,150.8	209.9	156.7	202.8	217.5	314.1	409.2	300.1	438.4	499.8	381.7	815.3	819.6	332.1	53.6

Table 14.--Area of commercial forest land by stocking class of growing-stock trees and stand-size class, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Stocking class (percent)	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Less than 16.7	65.6	--	--	--	65.6
16.7 to 60.9	718.3	163.7	279.1	275.5	--
61.0 to 100.9	2,198.2	516.4	1,215.0	466.8	--
101.0 to 133.9	1,792.8	398.9	968.0	425.9	--
134.0+	375.9	73.5	123.4	179.0	--
All classes	5,150.8	1,152.5	2,585.5	1,347.2	65.6

Table 15.--Area of commercial forest land in plantations by forest type and stand-age class, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	72.5	5.7	16.9	16.6	15.0	13.1	5.2	--	--	--	--	--	--	--
Red pine	97.9	21.2	29.1	10.7	13.9	21.0	--	2.0	--	--	--	--	--	--
White pine	5.1	--	--	--	--	1.7	1.7	--	1.7	--	--	--	--	--
White spruce	17.4	--	3.7	2.0	10.0	1.7	--	--	--	--	--	--	--	--
All types	192.9	26.9	49.7	29.3	38.9	37.5	6.9	2.0	1.7	--	--	--	--	--

Table 16.--Area of commercial forest land with conifer understory by forest type and conifer understory species, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All species	Conifer understory species								
		White pine	Red pine	Jack pine	Balsam fir	White spruce	Black spruce	Hemlock	Northern white-cedar	Other softwoods
Jack pine	92.5	1.9	43.1	43.9	3.6	--	--	--	--	--
Red pine	61.5	2.8	37.9	--	17.5	3.3	--	--	--	--
White pine	10.9	7.3	--	--	3.6	--	--	--	--	--
Balsam fir	116.5	--	--	--	116.5	--	--	--	--	--
White spruce	1.7	--	--	--	1.7	--	--	--	--	--
Black spruce	69.9	--	--	--	14.2	--	55.7	--	--	--
Northern white-cedar	54.3	--	--	--	46.4	--	--	--	6.1	1.8
Tamarack	70.1	--	--	--	22.4	--	27.7	--	--	20.0
Oak-hickory	72.6	13.4	9.3	33.2	16.7	--	--	--	--	--
Elm-ash-soft maple	110.3	--	--	--	99.4	1.7	3.9	3.5	--	1.8
Maple-birch	387.7	28.4	1.7	--	322.2	11.1	--	24.3	--	--
Aspen	377.0	40.2	7.4	12.9	275.6	17.2	14.4	1.8	2.0	5.5
Paper birch	57.5	--	--	--	53.6	--	3.9	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--
Nonstocked	5.8	2.3	--	--	3.5	--	--	--	--	--
All types	1,488.3	96.3	99.4	90.0	996.9	33.3	105.6	29.6	8.1	29.1

Table 17.--Area of noncommercial forest land by ownership class, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All areas	Productive-reserved areas	Unproductive areas
National Forest	86.7	24.1[1/]	62.6
Miscellaneous federal	45.0	45.0	--
State	58.0	39.8	18.2
County and municipal	24.9	5.7	19.2
Indian	2.2	--	2.2
Forest industry	5.3	--	5.3
Farmer	39.3	--	39.3
Misc. private-corp.	1.8	--	1.8
Misc. private-indiv.	17.2	--	17.2
Total	280.4	114.6	165.8

[1/] Includes 17.0 thousand acres of productive-deferred areas.

Table 18.--Area of noncommercial forest land by forest type, Northwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All areas	Productive-reserved areas[1/]	Unproductive areas
Jack pine	2.6	2.6	--
Red pine	--	--	--
White pine	--	--	--
Balsam fir	7.8	0.9	6.9
White spruce	--	--	--
Black spruce	113.2	6.9	106.3
Northern white-cedar	4.5	0.7	3.8
Tamarack	10.0	--	10.0
Oak-hickory	7.1	5.1	2.0
Elm-ash-soft maple	50.9	16.0	34.9
Maple-birch	42.6	42.6	--
Aspen	38.6	38.6	--
Paper birch	1.2	1.2	--
Exotic	--	--	--
Nonstocked	1.9	--	1.9
All types	280.4	114.6	165.8

[1/] Includes 17.0 thousand acres of productive-deferred areas.

Table 19.--Number of all live trees on commercial forest land by species group and diameter class, Northwest Unit, Wisconsin, 1983

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods															
Jack pine	118,604	31,400	32,629	30,159	16,542	5,594	1,829	397	50	4	--	--	--	--	--
Red pine	51,463	20,610	9,590	8,318	5,877	3,955	1,625	581	370	326	153	35	23	--	--
White pine	24,569	10,910	4,100	1,659	2,381	1,730	1,131	886	625	504	265	168	194	16	--
White spruce	39,719	16,370	5,880	7,469	5,197	2,781	1,098	558	236	99	13	9	9	--	--
Black spruce	115,259	68,400	34,380	9,676	2,241	453	77	14	18	--	--	--	--	--	--
Balsam fir	321,117	184,570	71,770	35,953	18,069	7,913	2,048	551	211	28	4	--	--	--	--
Hemlock	11,284	2,330	1,430	2,001	1,419	1,457	1,062	669	402	298	134	27	52	3	--
Tamarack	62,445	34,860	14,940	7,251	3,809	1,162	319	78	20	3	3	--	--	--	--
Northern white-cedar	43,341	7,980	10,670	9,175	6,992	4,365	2,854	785	338	131	36	11	4	--	--
Other softwoods	48	--	--	29	--	--	19	--	--	--	--	--	--	--	--
Total	787,849	377,430	185,389	111,690	62,527	29,410	12,062	4,519	2,270	1,393	608	250	282	19	--
Hardwoods															
White oak	74,699	52,020	9,590	4,958	3,698	1,580	1,264	811	383	189	99	64	36	7	--
Select red oak	116,501	45,990	16,960	19,281	15,380	9,277	5,391	2,259	1,101	416	219	108	107	12	--
Other red oak	37,545	22,880	4,780	4,597	2,080	1,297	776	575	296	99	68	68	29	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hickory	7,265	2,880	2,530	1,039	556	84	156	14	6	--	--	--	--	--	--
Basswood	80,814	26,510	12,330	13,935	11,579	8,552	4,392	2,110	799	337	148	68	51	3	--
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	52,446	21,910	13,000	7,483	4,074	2,733	1,336	862	437	306	138	63	87	17	--
Hard maple	465,585	246,130	111,560	56,562	27,872	12,224	5,495	2,878	1,472	750	344	149	142	7	--
Soft maple	527,976	280,865	140,980	62,874	26,523	9,951	3,560	1,883	701	350	185	69	29	6	--
Elm	53,756	24,840	9,660	6,850	4,877	2,824	2,111	1,184	705	355	164	87	81	15	3
Black ash	169,786	92,790	35,930	23,103	9,915	5,142	1,915	601	267	82	18	14	9	--	--
White & green ash	34,409	19,200	3,960	4,185	2,690	2,310	1,264	472	256	57	15	--	--	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	270	270	--	--	--	--	--	--	--	--	--	--	--	--	--
Willow	210	--	190	--	--	--	10	9	--	--	--	--	--	1	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	7,691	4,570	1,690	628	363	220	95	86	39	--	--	--	--	--	--
Bigtooth aspen	114,805	71,740	11,000	10,183	8,440	7,194	4,250	1,262	513	157	48	12	6	--	--
Quaking aspen	694,177	484,337	75,589	51,440	40,727	24,416	11,084	4,647	1,453	374	69	36	5	--	--
Paper birch	188,977	55,730	52,140	40,356	26,794	9,637	3,262	848	175	27	6	2	--	--	--
Black cherry	55,580	45,950	3,630	3,216	1,674	809	243	58	--	--	--	--	--	--	--
Black walnut	10	--	--	--	--	--	10	--	--	--	--	--	--	--	--
Butternut	1,375	--	480	92	525	61	146	26	37	--	8	--	--	--	--
Other hardwoods	68	--	--	47	21	--	--	--	--	--	--	--	--	--	--
Noncommercial species	219,262	180,780	32,780	4,422	942	211	113	14	--	--	--	--	--	--	--
Total	2,903,207	1,679,392	538,779	315,251	188,730	98,522	46,873	20,599	8,640	3,499	1,529	740	582	68	3
All species	3,691,056	2,056,822	724,168	426,941	251,257	127,932	58,935	25,118	10,910	4,892	2,137	990	864	87	3

Table 20.--Number of growing-stock trees on commercial forest land by species group and diameter class, Northwest Unit, Wisconsin, 1983

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods															
Jack pine	114,854	31,040	31,929	28,766	15,831	5,272	1,744	234	34	4	--	--	--	--	--
Red pine	51,117	20,610	9,590	8,151	5,763	3,910	1,616	575	370	321	153	35	23	--	--
White pine	23,933	10,910	4,100	1,582	2,280	1,548	1,063	816	572	482	253	143	173	11	--
White spruce	39,171	16,370	5,530	7,428	5,146	2,743	1,047	541	236	99	13	9	9	--	--
Black spruce	113,106	68,020	33,350	9,054	2,120	453	77	14	18	--	--	--	--	--	--
Balsam fir	317,302	183,900	70,010	35,689	17,364	7,602	1,978	527	205	23	4	--	--	--	--
Hemlock	9,272	2,330	1,050	1,563	960	1,174	850	540	379	250	101	27	47	1	--
Tamarack	61,307	34,620	14,760	6,975	3,481	1,089	293	63	20	3	3	--	--	--	--
Northern white-cedar	36,226	7,260	9,650	7,611	5,520	3,211	2,061	557	238	93	18	5	2	--	--
Other softwoods	48	--	--	29	--	--	19	--	--	--	--	--	--	--	--
Total	766,336	375,060	179,969	106,848	58,465	27,002	10,748	3,867	2,072	1,275	545	219	254	12	--
Hardwoods															
White oak	67,579	48,850	8,140	3,781	3,407	1,309	1,021	599	247	118	60	30	14	3	--
Select red oak	108,856	45,170	15,750	17,131	13,948	8,522	4,752	2,007	937	317	152	84	78	8	--
Other red oak	29,798	21,320	2,260	2,891	1,359	908	438	321	191	51	38	19	2	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hickory	6,866	2,880	2,280	953	556	84	99	14	--	--	--	--	--	--	--
Basswood	74,713	24,820	11,620	12,438	10,766	8,030	3,993	1,874	705	257	117	58	35	--	--
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	41,498	20,470	10,190	4,341	2,626	1,912	805	557	249	199	82	33	31	3	--
Hard maple	425,240	235,920	102,360	46,320	23,391	9,365	3,959	2,017	1,031	516	211	91	55	4	--
Soft maple	481,751	265,038	130,310	52,417	21,862	7,532	2,527	1,272	408	229	118	24	14	--	--
Elm	48,790	23,910	8,650	5,688	4,263	2,316	1,786	1,009	580	302	142	76	57	8	3
Black ash	160,351	90,450	32,280	21,225	8,953	4,896	1,675	527	237	75	14	14	5	--	--
White & green ash	33,194	19,200	3,570	4,053	2,492	2,124	1,093	387	215	45	15	--	--	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	270	270	--	--	--	--	--	--	--	--	--	--	--	--	--
Willow	10	--	--	--	--	--	10	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	7,564	4,570	1,690	580	335	197	85	79	28	--	--	--	--	--	--
Bigtooth aspen	111,472	71,590	9,900	9,571	8,053	6,797	3,852	1,114	421	132	37	5	--	--	--
Quaking aspen	669,213	479,297	71,749	45,497	37,172	21,385	9,190	3,616	1,029	247	20	10	1	--	--
Paper birch	175,569	53,080	48,850	36,536	24,733	8,733	2,803	692	121	18	3	--	--	--	--
Black cherry	51,411	45,130	3,090	1,673	905	460	136	17	--	--	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Butternut	1,013	--	480	92	273	41	88	9	27	--	3	--	--	--	--
Other hardwoods	21	--	--	--	21	--	--	--	--	--	--	--	--	--	--
Total	2,495,179	1,451,965	463,169	265,187	165,115	84,611	38,312	16,111	6,426	2,506	1,012	444	292	26	3
All species	3,261,515	1,827,025	643,138	372,035	223,580	111,613	49,060	19,978	8,498	3,781	1,557	663	546	38	3

Table 21.--Net volume of growing stock on commercial forest land by species group, Northwest Unit, Wisconsin, 1968 and 1983

(In thousand cubic feet)

Species group	1968	1983
Softwoods		
Jack pine	188,200	237,849
Red pine	80,000	179,071
White pine	107,300	154,382
White spruce	33,400	121,342
Black spruce	27,900	41,303
Balsam fir	223,600	299,183
Hemlock	77,900	66,348
Tamarack	63,900	59,582
Northern white-cedar	108,900	124,494
Other softwoods	--	325
Total	911,100	1,283,879
Hardwoods		
White oak	51,500	73,731
Select red oak	227,500	392,975
Other red oak	39,100	41,248
Hickory	2,500	9,803
Basswood	241,300	334,289
Beech	--	--
Yellow birch	94,800	85,401
Hard maple	376,700	553,791
Soft maple	241,000	468,019
Elm	164,200	141,996
Ash	220,500	310,079
Cottonwood	100	--
Willow	--	163
Balsam poplar	6,400	8,547
Bigtooth aspen	198,900	272,055
Quaking aspen	780,600	872,273
Paper birch	326,800	438,362
Black cherry	11,700	19,820
Black walnut	--	--
Butternut	3,100	4,841
Other hardwoods	300	118
Total	2,987,000	4,027,511
All species	3,898,100	5,311,390

Table 22.--Net volume of all live trees on commercial forest land by species group and diameter class, Northwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods													
Jack pine	249,766	79,934	85,370	50,257	24,793	8,030	1,248	134	--	--	--	--	--
Red pine	180,953	30,327	35,654	40,133	24,535	13,010	11,094	13,553	8,260	2,376	2,011	--	--
White pine	165,336	2,858	10,791	14,846	17,802	21,295	20,765	23,063	16,281	12,980	21,644	3,011	--
White spruce	123,124	15,993	29,298	29,315	19,185	14,168	8,067	4,687	794	683	934	--	--
Black spruce	43,208	23,005	12,772	4,997	1,398	374	662	--	--	--	--	--	--
Balsam fir	306,717	74,005	95,431	80,602	34,776	13,541	6,890	1,270	202	--	--	--	--
Hemlock	74,822	2,558	4,801	9,916	12,451	12,002	11,032	10,348	5,927	1,735	3,613	439	--
Tamarack	62,600	22,116	21,690	11,255	4,933	1,737	572	149	148	--	--	--	--
Northern white-cedar	148,777	22,811	32,996	34,283	32,113	12,885	7,784	4,093	1,174	407	231	--	--
Other softwoods	325	70	--	--	255	--	--	--	--	--	--	--	--
Total	1,355,628	273,677	328,803	275,604	172,241	97,042	68,114	57,297	32,786	18,181	28,433	3,450	--
Hardwoods													
White oak	93,828	10,655	16,626	12,703	15,420	14,307	8,974	5,692	3,900	2,853	2,018	680	--
Select red oak	436,775	61,404	87,572	89,018	79,505	47,709	31,839	14,975	9,791	6,384	7,209	1,369	--
Other red oak	64,635	9,675	8,991	10,141	9,226	10,141	6,942	3,034	2,514	2,654	1,317	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hickory	11,093	3,728	3,438	1,004	2,454	300	169	--	--	--	--	--	--
Basswood	360,691	36,970	66,717	88,653	70,034	47,253	24,044	12,434	6,969	4,008	3,457	152	--
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	118,645	11,573	17,396	23,296	16,475	15,290	10,652	9,772	5,159	2,940	4,779	1,313	--
Hard maple	674,694	159,851	157,530	116,360	81,331	60,432	41,018	26,177	14,493	8,029	8,760	713	--
Soft maple	566,477	194,167	150,703	93,626	49,632	36,816	17,088	11,874	7,555	2,944	1,812	260	--
Elm	164,784	10,897	20,517	23,894	29,664	24,443	20,565	13,252	7,899	5,040	6,000	2,172	441
Black ash	241,212	85,165	59,414	47,921	26,227	11,414	6,548	2,684	698	774	367	--	--
White & green ash	91,791	13,018	15,705	22,978	19,694	10,474	7,217	1,945	760	--	--	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--
Willow	411	--	--	--	163	175	--	--	--	--	--	73	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	9,263	1,028	1,781	2,062	1,414	1,844	1,134	--	--	--	--	--	--
Bigtooth aspen	286,444	29,532	53,503	77,691	70,418	29,243	16,196	6,496	2,462	621	282	--	--
Quaking aspen	952,087	178,092	246,672	233,078	155,483	88,622	35,451	11,231	2,065	1,115	278	--	--
Paper birch	474,727	150,998	162,759	93,348	45,776	16,446	4,280	833	176	111	--	--	--
Black cherry	33,587	11,783	10,070	7,376	3,265	1,093	--	--	--	--	--	--	--
Black walnut	147	--	--	--	147	--	--	--	--	--	--	--	--
Butternut	7,245	390	2,937	648	1,825	405	811	--	229	--	--	--	--
Other hardwoods	226	108	118	--	--	--	--	--	--	--	--	--	--
Noncommercial species	14,997	8,226	3,991	1,391	1,171	218	--	--	--	--	--	--	--
Total	4,603,759	977,260	1,086,440	945,188	679,324	416,625	232,928	120,399	64,670	37,473	36,279	6,732	441
All species	5,959,387	1,250,937	1,415,243	1,220,792	851,565	513,667	301,042	177,696	97,456	55,654	64,712	10,182	441

Table 23.--Net volume of timber on commercial forest land by class of timber and softwoods and hardwoods, Northwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Live trees			
Growing-stock trees			
Poletimber	3,275,211	578,631	2,696,580
Sawtimber			
Saw log portion	1,355,647	529,409	826,238
Upper stem portion	680,532	175,839	504,693
Subtotal	2,036,179	705,248	1,330,931
Total growing stock	5,311,390	1,283,879	4,027,511
Cull trees			
Rough and rotten cull trees			
Poletimber	337,244	24,036	313,208
Sawtimber	218,083	33,622	184,461
Subtotal	555,327	57,658	497,669
Short-log trees	92,670	14,091	78,579
Total cull	647,997	71,749	576,248
All live trees	5,959,387	1,355,628	4,603,759
Salvable dead trees			
Growing-stock trees	275,356	49,733	225,623
Cull trees	4,563	1,172	3,391
All salvable dead trees	279,919	50,905	229,014
All classes	6,239,306	1,406,533	4,832,773

Table 24.--Net volume of all live trees by individual species, Northwest Unit, Wisconsin, 1983

Species	Total all live	All live trees			Total saw log	Saw log size trees	
		Growing stock	Short-log cull	Rough and rotten cull		Sawtimber	Short-log
	- - - - - - - -Thousand cubic feet- - - - - - - - -				- - - - -Thousand board feet[1]- - - -		
Softwoods							
Jack pine	249,766	237,849	3,594	8,323	415,987	403,480	12,507
Red pine	180,953	179,071	71	1,811	654,661	654,363	298
White pine	165,336	154,382	2,863	8,091	756,434	745,829	10,605
White spruce	123,124	121,342	441	1,341	370,888	368,931	1,957
Black spruce	43,208	41,303	--	1,905	33,543	33,543	--
Balsam fir	306,717	299,183	899	6,635	590,861	588,647	2,214
Hemlock	74,822	66,348	2,768	5,706	271,636	264,927	6,709
Tamarack	62,600	59,582	429	2,589	96,244	94,390	1,854
Northern white-cedar	148,777	124,494	3,026	21,257	398,818	388,516	10,302
Scotch pine	255	255	--	--	1,392	1,392	--
Norway spruce	70	70	--	--	--	--	--
Total	1,355,628	1,283,879	14,091	57,658	3,590,464	3,544,018	46,446
Hardwoods							
White oak	57,145	43,887	3,877	9,381	129,553	119,535	10,018
Swamp white oak	826	826	--	--	2,475	2,475	--
Bur oak	35,857	29,018	1,625	5,214	84,259	80,008	4,251
Northern red oak	436,775	392,975	10,730	33,070	870,450	846,693	23,757
Northern pin oak	57,287	35,779	5,122	16,386	103,197	91,453	11,744
Black oak	7,348	5,469	220	1,659	9,918	9,424	494
Bitternut hickory	11,093	9,803	671	619	11,496	9,661	1,835
American basswood	360,691	334,289	4,761	21,641	743,128	732,985	10,143
Yellow birch	118,645	85,401	5,114	28,130	233,210	221,270	11,940
Sugar maple	674,694	553,791	15,623	105,280	942,711	905,072	37,639
Red maple	557,339	460,778	7,006	89,555	491,932	472,484	19,448
Silver maple	9,138	7,241	274	1,623	26,781	26,078	703
American elm	151,900	130,729	7,113	14,058	401,615	383,615	18,000
Slippery elm	5,494	4,352	196	946	12,685	12,179	506
Rock elm	7,390	6,915	132	343	15,581	15,247	334
Black ash	241,212	226,230	695	14,287	271,870	269,758	2,112
White ash	81,760	74,940	1,084	5,736	177,007	174,423	2,584
Green ash	10,031	8,909	269	853	16,827	16,148	679
Black willow	411	163	--	248	720	720	--
Balsam poplar	9,263	8,547	--	716	17,149	17,149	--
Bigtooth aspen	286,444	272,055	2,826	11,563	535,162	530,658	4,504
Quaking aspen	952,087	872,273	7,700	72,114	1,272,276	1,255,261	17,015
Paper birch	474,727	438,362	3,439	32,926	302,983	293,605	9,378
Black cherry	33,587	19,820	102	13,665	14,450	14,138	312
Black walnut	147	--	--	147	--	--	--
Butternut	7,245	4,841	--	2,404	13,381	13,381	--
Boxelder	226	118	--	108	--	--	--
Noncommercial species	14,997	--	--	14,997	--	--	--
Total	4,603,759	4,027,511	78,579	497,669	6,700,816	6,513,420	187,396
All species	5,959,387	5,311,390	92,670	555,327	10,291,280	10,057,438	233,842

[1] International 1/4-inch rule.

Table 25.--Net volume of noncommercial species on commercial forest land by individual species, Northwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Species	Cull volume
American hornbeam	223
Eastern hophornbeam	14,039
Chokecherry	231
Mountain ash	504
All species	14,997

Table 26.--Net volume of growing stock on commercial forest land by species group and county, Northwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All counties	County					
		Ashland	Barron	Bayfield	Burnett	Douglas	Iron
Softwoods							
Jack pine	237,849	1,100	456	67,583	56,886	62,569	--
Red pine	179,071	17,833	257	53,262	14,505	12,871	6,102
White pine	154,382	23,513	2,628	37,796	6,784	7,465	7,866
White spruce	121,342	41,820	--	11,297	--	12,831	12,126
Black spruce	41,303	6,961	579	1,011	357	8,250	7,746
Balsam fir	299,183	63,547	--	34,691	--	60,080	57,619
Hemlock	66,348	12,573	--	7,157	--	1,220	17,168
Tamarack	59,582	3,673	415	5,497	1,306	7,879	3,006
Northern white-cedar	124,494	38,217	--	13,299	--	9,479	31,936
Other softwoods	325	--	--	--	--	--	70
Total	1,283,879	209,237	4,335	231,593	79,838	182,644	143,639
Hardwoods							
White oak	73,731	141	17,152	637	10,839	1,240	--
Select red oak	392,975	6,794	28,970	107,971	33,600	20,538	7,631
Other red oak	41,248	--	1,312	2,877	15,756	2,054	--
Select hickory	--	--	--	--	--	--	--
Other hickory	9,803	--	758	--	542	--	--
Basswood	334,289	39,820	7,701	26,580	5,821	15,337	29,609
Beech	--	--	--	--	--	--	--
Yellow birch	85,401	15,111	81	5,827	135	5,200	17,739
Hard maple	553,791	124,845	4,502	72,378	4,106	27,163	80,295
Soft maple	468,019	55,722	7,540	53,614	11,300	36,532	33,959
Elm	141,996	20,076	6,425	10,954	6,777	8,107	15,159
Black ash	226,230	24,910	3,391	17,401	10,717	40,194	13,714
White & green ash	83,849	6,408	6,260	4,983	1,575	2,293	3,950
Sycamore	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--
Willow	163	--	--	--	163	--	--
Hackberry	--	--	--	--	--	--	--
Balsam poplar	8,547	--	--	2,272	--	5,193	957
Bigtooth aspen	272,055	14,604	14,454	72,999	26,716	11,830	9,053
Quaking aspen	872,273	93,501	27,989	151,387	49,312	109,617	55,132
Paper birch	438,362	35,944	12,523	94,786	19,277	77,957	29,867
Black cherry	19,820	3,912	619	--	1,708	--	3,099
Black walnut	--	--	--	--	--	--	--
Butternut	4,841	--	232	--	394	--	--
Other hardwoods	118	--	--	--	--	118	--
Total	4,027,511	441,788	139,909	624,666	198,738	363,373	300,164
All species	5,311,390	651,025	144,244	856,259	278,576	546,017	443,803

(Table 26 continued on next page)

(Table 26 continued)

Species group	County					
	Polk	Price	Rusk	Sawyer	Taylor	Washburn
Softwoods						
Jack pine	6,436	2,898	--	2,989	--	36,932
Red pine	232	28,406	4,262	28,666	2,634	10,041
White pine	3,012	5,659	10,684	35,563	5,754	7,658
White spruce	430	12,444	1,148	18,120	10,907	219
Black spruce	262	5,797	2,792	4,112	3,226	210
Balsam fir	--	38,493	8,064	21,339	12,072	3,278
Hemlock	--	9,115	1,034	9,589	8,492	--
Tamarack	2,292	14,788	3,233	5,804	7,264	4,425
Northern white-cedar	--	14,597	778	10,505	1,965	3,718
Other softwoods	--	--	--	--	--	255
Total	12,664	132,197	31,995	136,687	52,314	66,736
Hardwoods						
White oak	19,496	469	5,050	6,909	416	11,382
Select red oak	42,055	11,081	30,380	53,396	15,272	35,287
Other red oak	10,756	--	1,008	806	--	6,679
Select hickory	--	--	--	--	--	--
Other hickory	1,358	--	2,975	1,787	2,383	--
Basswood	10,961	27,890	44,741	64,954	43,018	17,857
Beech	--	--	--	--	--	--
Yellow birch	106	7,493	2,228	21,849	8,423	1,209
Hard maple	6,804	59,126	40,501	75,803	45,431	12,837
Soft maple	14,517	64,401	30,751	55,402	81,770	22,511
Elm	6,845	18,026	17,674	19,163	8,411	4,379
Black ash	7,714	25,834	19,273	28,745	18,247	16,090
White & green ash	4,630	8,231	11,922	16,903	13,104	3,590
Sycamore	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--
Willow	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	125
Bigtooth aspen	16,049	18,238	8,472	30,757	12,549	36,334
Quaking aspen	39,621	74,300	89,767	80,740	40,919	59,988
Paper birch	12,883	28,150	25,856	55,045	15,637	30,437
Black cherry	1,659	2,708	2,550	1,333	734	1,498
Black walnut	--	--	--	--	--	--
Butternut	2,143	--	1,152	430	137	353
Other hardwoods	--	--	--	--	--	--
Total	197,597	345,947	334,300	514,022	306,451	260,556
All species	210,261	478,144	366,295	650,709	358,765	327,292

Table 27.--Net volume of sawtimber on commercial forest land by species group and county, Northwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All counties	County					
		Ashland	Barron	Bayfield	Burnett	Douglas	Iron
Softwoods							
Jack pine	403,480	1,579	1,253	107,155	100,555	102,435	--
Red pine	654,363	62,006	1,501	213,680	20,209	64,375	30,287
White pine	745,829	102,388	13,470	183,374	32,526	39,005	40,615
White spruce	368,931	122,203	--	50,760	--	47,144	53,751
Black spruce	33,543	7,543	--	--	--	5,341	10,582
Balsam fir	588,647	124,121	--	80,986	--	113,036	113,300
Hemlock	264,927	52,129	--	30,216	--	5,190	70,495
Tamarack	94,390	3,902	--	17,225	2,123	12,525	538
Northern white-cedar	388,516	100,262	--	43,949	--	33,000	113,973
Other softwoods	1,392	--	--	--	--	--	--
Total	3,544,018	576,133	16,224	727,345	155,413	422,051	433,541
Hardwoods							
White oak	202,018	700	63,458	1,819	24,620	618	--
Select red oak	846,693	24,764	82,632	144,423	74,258	35,409	10,148
Other red oak	100,877	--	2,743	706	48,217	1,688	--
Select hickory	--	--	--	--	--	--	--
Other hickory	9,661	--	1,724	--	--	--	--
Basswood	732,985	89,513	28,365	60,163	14,694	37,958	66,205
Beech	--	--	--	--	--	--	--
Yellow birch	221,270	44,736	--	16,523	--	17,525	61,749
Hard maple	905,072	217,162	12,336	83,277	14,114	47,871	112,437
Soft maple	498,562	60,341	3,897	34,122	20,564	41,768	30,150
Elm	411,041	63,104	22,257	28,464	18,144	23,468	39,684
Black ash	269,758	19,384	4,624	22,894	25,637	50,738	17,147
White & green ash	190,571	13,094	12,623	5,896	3,035	1,798	13,814
Sycamore	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--
Willow	720	--	--	--	720	--	--
Hackberry	--	--	--	--	--	--	--
Balsam poplar	17,149	--	--	5,489	--	9,754	1,906
Bigtooth aspen	530,658	23,476	38,428	128,292	51,503	29,512	11,117
Quaking aspen	1,255,261	168,058	34,575	216,299	73,146	152,679	88,213
Paper birch	293,605	25,058	2,482	66,536	10,466	52,661	32,279
Black cherry	14,138	3,502	1,108	--	1,314	--	4,099
Black walnut	--	--	--	--	--	--	--
Butternut	13,381	--	1,320	--	2,357	--	--
Other hardwoods	--	--	--	--	--	--	--
Total	6,513,420	752,892	312,572	814,903	382,789	503,447	488,948
All species	10,057,438	1,329,025	328,796	1,542,248	538,202	925,498	922,489

[1/] International 1/4-inch rule.

(Table 27 continued on next page)

(Table 27 continued)

Species group	County					
	Polk	Price	Rusk	Sawyer	Taylor	Washburn
Softwoods						
Jack pine	9,113	11,184	--	9,449	--	60,757
Red pine	1,312	90,249	20,241	108,207	9,318	32,978
White pine	16,995	28,960	53,965	171,614	26,413	36,504
White spruce	2,347	35,982	5,178	26,548	23,875	1,143
Black spruce	--	2,495	--	6,246	1,336	--
Balsam fir	--	72,749	16,989	37,764	21,508	8,194
Hemlock	--	38,075	3,374	38,944	26,504	--
Tamarack	5,737	20,912	4,099	6,471	11,134	9,724
Northern white-cedar	--	33,177	3,543	41,694	6,496	12,422
Other softwoods	--	--	--	--	--	1,392
Total	35,504	333,783	107,389	446,937	126,584	163,114
Hardwoods						
White oak	64,835	1,869	12,067	8,510	1,137	22,385
Select red oak	115,949	12,190	96,480	135,497	47,402	67,541
Other red oak	34,078	--	4,631	2,549	--	6,265
Select hickory	--	--	--	--	--	--
Other hickory	--	--	3,598	--	4,339	--
Basswood	29,508	54,208	102,459	123,045	99,957	26,910
Beech	--	--	--	--	--	--
Yellow birch	--	20,491	1,863	39,626	14,005	4,752
Hard maple	15,647	97,403	103,922	119,440	55,141	26,322
Soft maple	15,950	67,789	32,370	76,605	88,823	26,183
Elm	20,687	52,448	55,885	48,044	23,738	15,118
Black ash	8,209	27,173	31,494	33,077	14,532	14,849
White & green ash	6,205	24,506	25,916	41,781	36,290	5,613
Sycamore	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--
Willow	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--
Bigtooth aspen	34,288	22,819	20,056	82,465	18,625	70,077
Quaking aspen	44,271	114,047	121,632	139,002	25,466	77,873
Paper birch	6,104	31,385	7,678	33,710	11,995	13,251
Black cherry	--	2,041	1,382	692	--	--
Black walnut	--	--	--	--	--	--
Butternut	2,718	--	5,187	--	743	1,056
Other hardwoods	--	--	--	--	--	--
Total	398,449	528,369	626,620	884,043	442,193	378,195
All species	433,953	862,152	734,009	1,330,980	568,777	541,309

Table 28.--Net volume of growing stock on commercial forest land by species group and diameter class, Northwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods													
Jack pine	237,849	77,133	82,765	48,168	23,845	4,867	937	134	--	--	--	--	--
Red pine	179,071	29,830	35,016	39,704	24,411	12,867	11,094	13,502	8,260	2,376	2,011	--	--
White pine	154,382	2,755	10,412	13,477	17,048	19,863	19,531	22,356	15,640	11,265	19,904	2,131	--
White spruce	121,342	15,878	29,109	28,979	18,458	13,753	8,067	4,687	794	683	934	--	--
Black spruce	41,303	21,798	12,074	4,997	1,398	374	662	--	--	--	--	--	--
Balsam fir	299,183	73,349	92,651	78,048	33,786	13,161	6,815	1,171	202	--	--	--	--
Hemlock	66,348	2,235	3,607	8,606	10,822	10,689	10,704	9,439	4,757	1,735	3,457	297	--
Tamarack	59,582	21,444	20,244	10,871	4,624	1,530	572	149	148	--	--	--	--
Northern white-cedar	124,494	20,213	27,861	27,999	26,747	10,648	6,334	3,397	848	283	164	--	--
Other softwoods	325	70	--	--	255	-	--	--	--	--	--	--	--
Total	1,283,879	264,705	313,739	260,849	161,394	87,752	64,716	54,835	30,649	16,342	26,470	2,428	--
Hardwoods													
White oak	73,731	8,516	15,430	10,665	12,998	11,060	6,229	3,731	2,489	1,463	860	290	--
Select red oak	392,975	55,232	80,375	82,834	71,737	43,223	27,716	12,255	7,456	5,180	5,743	1,224	--
Other red oak	41,248	6,077	6,414	7,760	5,764	6,026	4,717	1,735	1,655	956	144	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hickory	9,803	3,438	3,438	1,004	1,623	300	--	--	--	--	--	--	--
Basswood	334,289	33,723	62,800	84,273	64,955	43,578	22,131	10,429	6,144	3,526	2,730	--	--
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	85,401	7,799	12,330	18,220	11,420	11,742	7,365	7,472	3,905	2,154	2,494	500	--
Hard maple	553,791	137,427	137,752	94,364	63,964	46,186	31,860	20,800	10,624	5,763	4,461	590	--
Soft maple	468,019	167,640	129,832	75,374	38,812	27,754	11,760	8,834	5,674	1,355	984	--	--
Elm	141,996	9,550	18,409	20,378	25,570	21,256	17,239	11,582	7,054	4,615	4,577	1,325	441
Black ash	226,230	79,965	54,974	46,231	24,082	10,637	6,231	2,491	565	774	280	--	--
White & green ash	83,849	12,661	14,617	21,267	17,461	8,889	6,390	1,804	760	--	--	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--
Willow	163	--	--	--	163	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	8,547	1,009	1,650	1,894	1,352	1,775	867	--	--	--	--	--	--
Bigtooth aspen	272,055	27,775	52,181	75,696	66,255	27,330	14,454	5,856	2,125	383	--	--	--
Quaking aspen	872,273	163,794	234,339	216,984	139,610	77,119	29,550	9,243	913	571	150	--	--
Paper birch	438,362	139,952	153,652	86,000	40,743	14,030	3,256	613	116	--	--	--	--
Black cherry	19,820	6,853	6,020	4,547	1,983	417	--	--	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--	--	--
Butternut	4,841	390	1,722	438	1,303	167	672	--	149	--	--	--	--
Other hardwoods	118	--	118	--	--	--	--	--	--	--	--	--	--
Total	4,027,511	861,801	986,053	847,929	589,795	351,489	190,437	96,845	49,629	26,740	22,423	3,929	441
All species	5,311,390	1,126,506	1,299,792	1,108,778	751,189	439,241	255,153	151,680	80,278	43,082	48,893	6,357	441

Table 29.--Net volume of sawtimber on commercial forest land by species group and diameter class, Northwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods											
Jack pine	403,480	249,954	122,729	25,185	4,905	707	--	--	--	--	--
Red pine	654,363	228,694	139,045	73,129	63,345	77,265	47,421	13,744	11,720	--	--
White pine	745,829	53,597	79,744	100,557	104,173	123,034	88,609	65,181	117,928	13,006	--
White spruce	368,931	129,562	89,306	69,656	42,132	25,002	4,307	3,766	5,200	--	--
Black spruce	33,543	21,305	6,748	1,932	3,558	--	--	--	--	--	--
Balsam fir	588,647	325,407	156,753	64,529	34,722	6,162	1,074	--	--	--	--
Hemlock	264,927	30,844	44,243	46,823	48,776	44,308	22,825	8,451	17,140	1,517	--
Tamarack	94,390	56,556	24,648	8,326	3,182	839	839	--	--	--	--
Northern white-cedar	388,516	137,092	135,824	55,922	33,992	18,466	4,699	1,587	934	--	--
Other softwoods	1,392	--	1,392	--	--	--	--	--	--	--	--
Total	3,544,018	1,233,011	800,432	446,059	338,785	295,783	169,774	92,729	152,922	14,523	--
Hardwoods											
White oak	202,018	--	71,146	56,793	30,959	18,359	12,067	7,094	4,182	1,418	--
Select red oak	846,693	--	347,004	207,996	134,073	59,699	36,758	25,792	29,027	6,344	--
Other red oak	100,877	--	27,871	28,781	22,584	8,329	7,953	4,649	710	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	9,661	--	8,204	1,457	--	--	--	--	--	--	--
Basswood	732,985	--	305,676	207,331	106,864	51,099	30,440	17,664	13,911	--	--
Beech	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	221,270	--	45,989	53,398	35,683	37,650	20,303	11,554	13,825	2,868	--
Hard maple	905,072	--	303,019	224,611	158,854	105,822	55,156	30,363	24,002	3,245	--
Soft maple	498,562	--	218,025	143,051	57,942	42,091	26,596	6,312	4,545	--	--
Elm	411,041	--	108,790	91,191	75,615	51,747	32,069	21,321	21,632	6,462	2,214
Black ash	269,758	--	153,104	61,349	33,983	13,087	2,907	3,908	1,420	--	--
White & green ash	190,571	--	99,711	46,473	31,993	8,752	3,642	--	--	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--
Willow	720	--	720	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	17,149	--	5,481	7,717	3,951	--	--	--	--	--	--
Bigtooth aspen	530,658	--	294,954	126,268	68,581	28,454	10,477	1,924	--	--	--
Quaking aspen	1,255,261	--	653,540	387,142	155,190	50,142	5,092	3,264	891	--	--
Paper birch	293,605	--	200,194	72,013	17,366	3,379	653	--	--	--	--
Black cherry	14,138	--	11,937	2,201	--	--	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Butternut	13,381	--	7,964	983	3,666	--	768	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--	--	--	--
Total	6,513,420	--	2,863,329	1,718,755	937,304	478,610	244,881	133,845	114,145	20,337	2,214
All species	10,057,438	1,233,011	3,663,761	2,164,814	1,276,089	774,393	414,655	226,574	267,067	34,860	2,214

[1/] International 1/4-inch rule.

Table 30.--Net volume of growing stock on commercial forest land by species group and forest type, Northwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	237,849	188,166	3,017	1,246	--	--	--	--
Red pine	179,071	8,641	123,086	9,164	2,345	131	888	--
White pine	154,362	2,268	22,692	40,448	7,352	1,753	1,070	843
White spruce	121,342	--	994	2,249	12,982	62,477	641	2,398
Black spruce	41,303	201	--	715	4,928	367	16,194	4,200
Balsam fir	299,183	80	1,736	2,234	107,449	2,080	2,337	12,806
Hemlock	66,348	--	--	--	1,649	--	1,287	3,930
Tamarack	59,582	--	--	735	3,360	--	6,945	3,633
Northern white-cedar	124,494	--	434	--	19,044	1,036	3,080	68,665
Other softwoods	325	--	--	255	--	--	--	--
Total	1,283,879	199,356	151,959	57,046	159,109	67,844	32,442	96,475
Hardwoods								
White oak	73,731	--	--	254	77	--	--	--
Select red oak	392,975	2,289	4,356	607	239	--	430	--
Other red oak	41,248	2,988	--	258	--	--	75	--
Select hickory	--	--	--	--	--	--	--	--
Other hickory	9,803	--	--	--	--	--	--	--
Basswood	334,289	--	--	421	--	--	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	85,401	--	--	--	2,985	--	173	5,307
Hard maple	553,791	--	666	--	1,429	118	107	--
Soft maple	468,019	--	4,038	1,248	6,298	688	781	2,235
Elm	141,996	--	102	251	1,382	--	--	--
Black ash	226,230	--	--	--	9,017	174	--	6,081
White & green ash	83,849	--	118	--	116	536	--	--
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--
Willow	163	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	8,547	--	--	--	110	--	--	--
Bigtooth aspen	272,055	1,761	1,985	1,440	462	185	191	223
Quaking aspen	872,273	6,075	7,169	9,194	18,317	1,339	1,816	1,841
Paper birch	438,362	492	3,168	1,440	10,301	522	1,359	3,167
Black cherry	19,820	--	--	--	102	--	--	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	4,841	--	--	--	--	--	--	--
Other hardwoods	118	--	--	--	--	--	--	--
Total	4,027,511	13,605	21,602	15,113	50,835	3,562	4,932	18,854
All species	5,311,390	212,961	173,561	72,159	209,944	71,406	37,374	115,329

(Table 30 continued on next page)

(Table 30 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods								
Jack pine	331	26,701	345	573	14,798	1,574	--	1,098
Red pine	304	5,019	256	5,633	20,992	2,612	--	--
White pine	3,782	7,299	6,382	32,842	23,257	4,312	--	82
White spruce	381	--	3,592	12,736	16,638	6,053	--	201
Black spruce	5,338	--	1,521	936	4,991	1,912	--	--
Balsam fir	5,075	681	31,462	62,340	53,250	17,653	--	--
Hemlock	79	594	4,448	50,823	1,982	1,556	--	--
Tamarack	30,826	141	4,612	1,108	6,230	1,372	--	620
Northern white-cedar	369	--	12,350	15,447	3,141	928	--	--
Other softwoods	--	--	--	70	--	--	--	--
Total	46,485	40,435	64,968	182,508	145,279	37,972	--	2,001
Hardwoods								
White oak	--	36,918	4,220	14,644	15,199	2,247	--	172
Select red oak	--	191,524	5,295	110,239	59,684	18,312	--	--
Other red oak	--	25,533	1,073	2,947	7,118	1,110	--	146
Select hickory	--	--	--	--	--	--	--	--
Other hickory	--	1,209	231	8,015	348	--	--	--
Basswood	--	10,738	11,747	295,218	12,531	3,634	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	135	81	8,411	65,440	2,147	722	--	--
Hard maple	105	7,610	10,304	512,290	14,724	6,337	--	101
Soft maple	2,081	18,090	68,843	267,862	74,626	21,118	--	111
Elm	--	4,198	35,520	88,646	9,905	1,992	--	--
Black ash	--	2,542	128,134	60,272	15,452	4,139	--	419
White & green ash	--	4,708	6,120	65,671	3,796	2,784	--	--
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--
Willow	--	--	163	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	--	109	807	287	6,911	323	--	--
Bigtooth aspen	2,249	31,403	1,732	30,499	187,996	11,929	--	--
Quaking aspen	2,729	16,105	26,025	122,947	621,962	34,658	--	2,096
Paper birch	1,876	29,568	12,392	86,479	131,887	154,923	--	788
Black cherry	--	1,459	132	11,261	5,853	1,013	--	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	--	1,163	--	3,678	--	--	--	--
Other hardwoods	--	--	118	--	--	--	--	--
Total	9,175	382,958	321,267	1,746,395	1,170,139	265,241	--	3,833
All species	55,660	423,393	386,235	1,928,903	1,315,418	303,213	--	5,834

Table 31.--Net volume of sawtimber on commercial forest land by species group and forest type, Northwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All types	Forest type: Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	403,480	272,336	11,563	3,593	--	--	--	--
Red pine	654,363	37,574	394,811	40,923	11,212	--	5,136	--
White pine	745,629	10,136	102,375	182,169	36,804	9,288	3,585	4,042
White spruce	368,931	--	4,116	10,243	48,556	140,169	2,603	8,552
Black spruce	33,543	--	--	--	7,861	767	7,432	5,475
Balsam fir	588,647	--	4,160	9,119	208,532	3,640	3,457	5,815
Hemlock	264,927	--	--	--	5,510	--	5,191	14,600
Tamarack	94,390	--	--	840	6,750	--	3,019	5,499
Northern white-cedar	388,516	--	1,134	--	60,358	--	8,825	203,009
Other softwoods	1,392	--	--	1,392	--	--	--	--
Total	3,544,018	320,046	518,159	248,279	385,583	153,864	39,248	246,992
Hardwoods								
White oak	202,018	--	--	678	--	--	--	--
Select red oak	846,693	2,766	4,555	--	1,205	--	596	--
Other red oak	100,877	6,269	--	810	--	--	411	--
Select hickory	--	--	--	--	--	--	--	--
Other hickory	9,661	--	--	--	--	--	--	--
Basswood	732,985	--	--	853	--	--	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	221,270	--	--	--	9,037	--	481	18,603
Hard maple	905,072	--	--	--	2,380	--	--	--
Soft maple	498,562	--	--	--	6,722	2,016	--	3,077
Elm	411,041	--	--	737	4,231	--	--	--
Black ash	269,758	--	--	--	5,887	1,011	--	759
White & green ash	190,571	--	--	--	--	--	--	--
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--
Willow	720	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	17,149	--	--	--	--	--	--	--
Bigtooth aspen	530,658	--	2,246	3,252	--	--	977	565
Quaking aspen	1,255,261	2,433	7,317	16,051	34,604	4,554	3,788	3,761
Paper birch	293,605	--	4,425	687	10,342	--	590	5,138
Black cherry	14,138	--	--	--	692	--	--	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	13,381	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--
Total	6,513,420	11,468	18,543	23,068	75,100	7,581	6,843	31,903
All species	10,057,438	331,514	536,702	271,347	460,683	161,445	46,091	278,895

(Table 31 continued on next page)

[1/] International 1/4-inch rule.

(Table 31 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods								
Jack pine	--	73,548	972	2,572	31,237	6,875	--	784
Red pine	1,734	17,203	1,465	32,380	97,764	14,161	--	--
White pine	18,274	37,671	33,252	172,600	113,257	22,051	--	325
White spruce	909	--	14,693	59,917	55,376	22,736	--	1,061
Black spruce	2,436	--	4,736	2,551	1,512	773	--	--
Balsam fir	1,441	556	66,716	152,060	96,169	36,982	--	--
Hemlock	339	2,751	15,295	206,335	8,590	6,316	--	--
Tamarack	34,199	--	19,788	1,548	18,406	2,644	--	1,697
Northern white-cedar	--	--	45,066	58,188	9,850	2,086	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	59,332	131,729	201,983	688,151	432,161	114,624	--	3,867
Hardwoods								
White oak	--	110,666	14,223	44,958	25,718	5,263	--	512
Select red oak	--	370,967	16,823	335,228	79,185	35,368	--	--
Other red oak	--	51,882	4,187	12,685	20,591	3,296	--	746
Select hickory	--	--	--	--	--	--	--	--
Other hickory	--	698	--	8,963	--	--	--	--
Basswood	--	22,882	26,806	664,372	12,568	5,504	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	629	--	21,561	168,342	867	1,750	--	--
Hard maple	--	11,539	6,952	869,626	8,972	5,603	--	--
Soft maple	1,903	14,238	124,118	325,361	17,405	3,722	--	--
Elm	--	13,652	103,795	264,062	18,724	5,840	--	--
Black ash	--	4,862	169,449	76,243	7,463	4,084	--	--
White & green ash	--	8,111	16,533	160,296	2,214	3,417	--	--
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--
Willow	--	--	720	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	--	--	2,045	--	14,342	762	--	--
Bigtooth aspen	--	67,812	4,941	71,166	347,031	32,668	--	--
Quaking aspen	1,292	24,402	40,872	288,712	766,624	59,524	--	1,327
Paper birch	2,054	11,758	12,870	87,720	75,019	83,002	--	--
Black cherry	--	--	--	10,750	1,314	1,382	--	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	--	5,034	--	8,347	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--
Total	5,878	718,503	565,895	3,396,831	1,398,037	251,185	—	2,585
All species	65,210	850,232	767,878	4,084,982	1,830,198	365,809	--	6,452

Table 32.--Net volume of growing stock on commercial forest land by species group and ownership class, Northwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All owners	Ownership class								
		National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Softwoods										
Jack pine	237,849	58,221	495	7,604	59,696	292	40,363	12,187	8,540	50,451
Red pine	179,071	63,164	--	2,453	37,691	13,578	13,003	6,315	11,455	31,412
White pine	154,382	26,363	--	3,826	24,597	18,100	14,936	6,862	9,636	50,062
White spruce	121,342	59,745	--	5,340	16,868	72	10,021	4,211	5,632	19,453
Black spruce	41,303	6,853	--	371	8,832	372	5,532	1,587	833	16,923
Balsam fir	299,183	30,638	--	11,429	82,217	11,126	29,985	15,637	13,179	104,972
Hemlock	66,348	18,169	--	1,675	10,356	6,128	9,761	1,458	4,557	14,244
Tamarack	59,582	7,040	293	3,728	7,289	--	5,195	2,844	3,002	30,191
Northern white-cedar	124,494	33,676	--	3,569	25,447	5,103	15,245	1,805	5,806	33,843
Other softwoods	325	--	--	--	--	--	--	--	--	325
Total	1,283,879	303,869	788	39,995	272,993	54,771	144,041	52,906	62,640	351,876
Hardwoods										
White oak	73,731	2,824	198	1,800	5,503	331	1,634	18,474	3,289	39,678
Select red oak	392,975	82,873	251	7,312	72,463	6,814	24,492	46,322	15,128	137,320
Other red oak	41,248	104	--	2,772	9,402	163	3,679	6,464	1,102	17,562
Select hickory	--	--	--	--	--	--	--	--	--	--
Other hickory	9,803	1,206	--	117	1,705	--	303	798	--	5,674
Basswood	334,289	40,196	213	9,318	83,543	8,703	40,816	19,410	13,857	118,233
Beech	--	--	--	--	--	--	--	--	--	--
Yellow birch	85,401	24,891	--	1,264	17,390	2,557	13,606	1,574	6,240	17,879
Hard maple	553,791	104,510	102	14,123	110,333	10,237	66,581	30,151	35,870	181,884
Soft maple	468,019	80,132	344	10,905	92,152	7,326	45,852	43,465	18,776	169,067
Elm	141,996	4,580	180	6,671	29,949	843	16,668	16,180	8,728	58,197
Black ash	226,230	23,103	735	9,136	60,721	740	25,673	15,867	8,459	81,796
White & green ash	83,849	10,379	310	2,034	14,247	334	12,500	8,104	4,021	31,920
Sycamore	--	--	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--
Willow	163	--	--	--	--	--	--	163	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--
Balsam poplar	8,547	--	--	345	3,689	--	809	697	964	2,043
Bigtooth aspen	272,055	60,729	--	9,870	36,314	12,599	8,737	28,902	10,821	104,083
Quaking aspen	872,273	69,710	1,239	22,267	189,432	28,391	59,574	101,573	46,052	354,035
Paper birch	438,362	54,556	1,290	14,481	94,299	13,719	35,871	34,858	31,593	157,695
Black cherry	19,820	--	--	915	5,299	--	996	2,032	830	9,748
Black walnut	--	--	--	--	--	--	--	--	--	--
Butternut	4,841	--	--	--	357	261	661	--	544	3,018
Other hardwoods	118	--	--	--	--	--	--	--	--	118
Total	4,027,511	559,793	4,862	113,330	826,798	93,018	358,452	375,034	206,274	1,489,950
All species	5,311,390	863,662	5,650	153,325	1,099,791	147,789	502,493	427,940	268,914	1,841,826

Table 33.--Net volume of sawtimber on commercial forest land by species group and ownership class, Northwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All owners	Ownership class								
		National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Softwoods										
Jack pine	403,480	88,089	--	19,775	80,300	1,513	53,463	21,013	33,158	106,169
Red pine	654,363	225,859	--	6,451	103,774	63,228	61,627	24,339	35,197	133,888
White pine	745,829	117,868	--	19,917	119,771	89,945	68,029	33,937	51,797	244,565
White spruce	368,931	130,454	--	18,124	75,085	--	40,144	15,515	19,177	70,432
Black spruce	33,543	6,199	--	640	7,747	1,069	780	3,113	2,288	11,707
Balsam fir	588,647	60,007	--	16,519	175,188	18,763	72,173	27,394	19,332	199,271
Hemlock	264,927	73,442	--	7,420	43,620	24,308	41,447	5,287	18,134	51,269
Tamarack	94,390	1,937	1,567	14,752	12,726	--	8,698	9,746	6,027	38,937
Northern white-cedar	388,516	88,327	--	11,086	99,451	18,682	57,105	2,542	17,140	94,183
Other softwoods	1,392	--	--	--	--	--	--	--	--	1,392
Total	3,544,018	792,182	1,567	114,684	717,662	217,508	403,466	142,886	202,250	951,813
Hardwoods										
White oak	202,018	--	--	5,345	11,688	728	3,614	59,045	9,095	112,503
Select red oak	846,693	105,776	1,231	14,665	132,026	21,199	54,403	126,913	42,856	347,624
Other red oak	100,877	--	--	6,959	15,980	769	7,490	26,943	2,303	40,433
Select hickory	--	--	--	--	--	--	--	--	--	--
Other hickory	9,661	2,550	--	--	767	--	--	745	--	5,599
Basswood	732,985	100,538	--	18,641	159,888	25,200	90,581	61,647	32,267	244,223
Beech	--	--	--	--	--	--	--	--	--	--
Yellow birch	221,270	48,759	--	3,741	55,159	9,701	42,326	4,100	18,862	38,622
Hard maple	905,072	123,842	--	31,715	170,816	27,592	100,293	63,594	63,373	323,847
Soft maple	498,562	115,418	--	11,686	110,967	10,514	49,072	43,720	13,567	143,618
Elm	411,041	13,228	--	18,436	82,069	2,381	48,249	47,367	24,913	174,398
Black ash	269,758	20,875	967	10,638	85,106	804	35,730	16,229	11,179	88,230
White & green ash	190,571	27,985	--	7,281	25,756	1,862	34,882	16,492	7,838	68,475
Sycamore	--	--	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--
Willow	720	--	--	--	--	--	--	720	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--
Balsam poplar	17,149	--	--	--	11,127	--	1,905	1,079	1,373	1,665
Bigtooth aspen	530,658	89,775	--	25,054	56,482	25,991	22,483	63,733	32,905	214,235
Quaking aspen	1,255,261	78,554	2,666	34,094	290,924	59,412	78,262	123,596	71,214	516,539
Paper birch	293,605	31,205	--	8,657	57,578	13,184	24,861	19,724	23,727	114,669
Black cherry	14,138	--	--	692	3,928	--	1,524	--	1,085	6,909
Black walnut	--	--	--	--	--	--	--	--	--	--
Butternut	13,381	--	--	--	996	--	3,088	--	2,209	7,088
Other hardwoods	--	--	--	--	--	--	--	--	--	--
Total	6,513,420	758,505	4,864	197,604	1,271,257	199,337	598,763	675,647	358,766	2,448,677
All species	10,057,438	1,550,687	6,431	312,288	1,988,919	416,845	1,002,229	818,533	561,016	3,400,490

[1/] International 1/4-inch rule.

Table 34.--Net volume of growing stock on commercial forest land by forest type and stand-age class, Northwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	212,961	3,279	5,982	17,004	46,460	99,933	28,719	3,850	4,836	2,898	--	--	--	--
Red pine	173,561	--	7,450	10,669	43,695	53,233	28,701	2,017	11,792	10,508	5,496	--	--	--
White pine	72,159	--	--	--	--	5,663	8,562	21,528	26,574	5,697	--	4,135	--	--
Balsam fir	209,944	5,498	7,315	15,372	15,948	37,916	59,423	44,570	2,698	9,280	1,991	7,177	2,756	--
White spruce	71,406	--	--	18,454	39,023	7,812	--	6,117	--	--	--	--	--	--
Black spruce	37,374	2,347	2,299	5,572	6,376	5,963	3,039	1,109	5,995	4,674	--	--	--	--
Northern white-cedar	115,329	--	--	2,096	30	21,030	4,537	15,468	8,771	14,447	14,573	4,605	10,010	19,762
Tamarack	55,660	2,441	6,877	4,619	3,417	14,287	5,130	851	8,305	5,569	--	1,712	1,474	978
Oak-hickory	423,393	16,949	6,668	2,887	15,342	64,735	160,048	40,818	45,659	28,228	15,400	24,869	1,790	--
Elm-ash-soft maple	386,235	4,082	11,608	19,624	34,013	52,394	56,783	50,645	42,016	28,366	31,195	27,948	18,439	9,122
Maple-birch	1,928,903	32,792	37,940	55,864	102,391	392,209	470,975	334,655	148,479	116,627	76,367	70,367	48,190	42,047
Aspen	1,315,418	58,943	62,678	78,947	229,926	444,686	274,318	116,616	36,634	12,670	--	--	--	--
Paper birch	303,213	5,980	9,710	15,476	42,455	100,035	71,450	46,636	6,782	2,039	--	2,650	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	5,834	5,834	--	--	--	--	--	--	--	--	--	--	--	--
All types	5,311,390	138,145	158,527	246,584	579,076	1,299,896	1,171,685	684,880	348,541	241,003	145,022	143,463	82,659	71,909

Table 35.--Net volume of sawtimber on commercial forest land by forest type and stand-age class, Northwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	331,514	9,728	4,834	16,172	37,166	159,884	57,678	14,011	18,329	13,712	--	--	--	--
Red pine	536,702	--	6,660	2,966	97,711	194,825	105,904	10,381	53,894	46,610	17,751	--	--	--
White pine	271,347	--	--	--	--	12,067	24,245	71,790	118,847	25,767	--	18,631	--	--
Balsam fir	460,683	11,718	13,455	20,814	28,989	60,839	149,497	97,779	8,223	28,972	5,857	24,985	9,555	--
White spruce	161,445	--	--	13,869	106,946	13,772	--	26,858	--	--	--	--	--	--
Black spruce	46,091	1,366	1,975	7,715	6,639	1,646	1,180	--	14,940	10,630	--	--	--	--
Northern white-cedar	278,895	--	--	2,945	--	35,653	6,930	28,023	17,832	29,295	48,457	19,268	26,476	64,016
Tamarack	65,210	2,128	7,741	2,790	3,093	10,215	1,151	--	18,499	11,578	--	2,597	4,509	909
Oak-hickory	850,232	37,386	9,667	1,361	24,177	82,562	244,482	83,345	120,072	96,452	61,915	81,983	6,830	--
Elm-ash-soft maple	767,878	6,661	24,696	16,206	37,815	78,418	97,250	112,004	87,319	65,314	80,751	73,799	52,890	34,755
Maple-birch	4,084,982	54,001	55,582	70,804	133,078	558,761	867,737	742,922	404,091	343,492	253,769	250,125	181,661	168,959
Aspen	1,830,198	118,113	73,399	73,345	216,198	489,318	451,266	250,813	114,467	43,279	--	--	--	--
Paper birch	365,809	8,108	5,769	5,099	40,319	106,244	96,934	77,779	10,149	6,901	--	8,507	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	6,452	6,452	--	--	--	--	--	--	--	--	--	--	--	--
All types	10,057,438	255,661	203,778	234,086	732,131	1,804,204	2,104,254	1,515,705	986,662	722,002	468,500	479,895	281,921	268,639

[1/] International 1/4-inch rule.

Table 36.--Net volume of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Northwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)						
		0-10	11-20	21-30	31-40	41-50	51-60	61-70
Jack pine								
Sawtimber	41,543	--	--	--	786	877	1,738	4,630
Poletimber	155,658	--	--	--	1,044	1,622	5,628	6,085
Sapling & seedling	15,760	84	--	1,095	1,878	1,401	2,002	206
All stands	212,961	84	--	1,095	3,708	3,900	9,368	10,921
Red pine								
Sawtimber	119,795	--	--	--	677	2,017	1,542	--
Poletimber	47,785	--	--	--	--	--	1,389	--
Sapling & seedling	5,981	--	--	243	1,043	--	1,519	--
All stands	173,561	--	--	243	1,720	2,017	4,450	--
White pine								
Sawtimber	63,856	--	--	--	1,023	--	895	--
Poletimber	8,303	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	72,159	--	--	--	1,023	--	895	--
Balsam fir								
Sawtimber	91,780	--	--	--	--	2,750	13,186	1,727
Poletimber	98,005	--	--	691	--	--	6,688	11,121
Sapling & seedling	20,159	--	486	1,157	443	1,724	1,946	3,788
All stands	209,944	--	486	1,848	443	4,474	21,820	16,636
White spruce								
Sawtimber	45,810	--	--	--	--	--	--	--
Poletimber	25,097	--	--	--	--	--	--	--
Sapling & seedling	499	--	--	--	--	--	499	--
All stands	71,406	--	--	--	--	--	499	--
Black spruce								
Sawtimber	2,813	--	--	--	--	--	--	--
Poletimber	21,143	--	--	--	--	--	2,048	1,358
Sapling & seedling	13,418	--	132	1,406	492	5,039	906	1,378
All stands	37,374	--	132	1,406	492	5,039	2,954	2,736
Northern white-cedar								
Sawtimber	60,374	--	--	--	--	--	304	2,045
Poletimber	52,829	--	--	--	--	--	1,710	--
Sapling & seedling	2,126	--	30	--	--	--	1,441	--
All stands	115,329	--	30	--	--	--	3,455	2,045

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine							
Sawtimber	8,439	6,130	1,165	14,323	3,455	--	--
Poletimber	18,545	14,098	66,258	32,024	7,177	3,177	--
Sapling & seedling	7,521	1,573	--	--	--	--	--
All stands	34,505	21,801	67,423	46,347	10,632	3,177	--
Red pine							
Sawtimber	--	1,415	5,433	35,737	27,785	38,609	6,580
Poletimber	625	4,644	5,991	10,689	11,485	12,962	--
Sapling & seedling	2,171	--	--	1,005	--	--	--
All stands	2,796	6,059	11,424	47,431	39,270	51,571	6,580
White pine							
Sawtimber	--	2,313	--	20,605	18,125	20,895	--
Poletimber	--	2,619	--	3,270	2,414	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	4,932	--	23,875	20,539	20,895	--
Balsam fir							
Sawtimber	5,768	4,090	2,924	19,908	32,253	6,338	2,836
Poletimber	1,159	11,208	5,044	12,142	20,789	23,490	5,673
Sapling & seedling	5,793	1,213	2,237	--	--	1,372	--
All stands	12,720	16,511	10,205	32,050	53,042	31,200	8,509
White spruce							
Sawtimber	--	--	--	--	--	10,657	35,153
Poletimber	--	--	--	--	17,955	7,142	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	17,955	17,799	35,153
Black spruce							
Sawtimber	--	--	--	--	2,813	--	--
Poletimber	6,787	1,213	1,861	1,405	6,471	--	--
Sapling & seedling	856	1,784	415	--	1,010	--	--
All stands	7,643	2,997	2,276	1,405	10,294	--	--
Northern white-cedar							
Sawtimber	2,866	1,529	2,748	--	18,270	13,014	19,598
Poletimber	1,078	4,304	--	29,429	8,371	7,937	--
Sapling & seedling	--	--	--	--	--	655	--
All stands	3,944	5,833	2,748	29,429	26,641	21,606	19,598

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre) 0-10	11-20	21-30	31-40	41-50	51-60	61-70
Tamarack								
Sawtimber	8,936	--	380	--	--	1,089	1,121	1,474
Poletimber	30,768	--	--	430	--	2,405	2,829	8,983
Sapling & seedling	15,956	93	218	1,947	1,627	1,063	4,247	1,009
All stands	55,660	93	598	2,377	1,627	4,557	8,197	11,466
Oak-hickory								
Sawtimber	150,915	--	--	--	2,248	1,579	960	10,350
Poletimber	245,974	--	--	556	--	444	2,267	5,139
Sapling & seedling	26,504	272	1,087	2,195	7,339	9,828	2,655	--
All stands	423,393	272	1,087	2,751	9,587	11,851	5,882	15,489
Elm-ash-soft maple								
Sawtimber	131,670	--	624	1,353	1,970	1,204	8,010	2,501
Poletimber	224,186	--	--	704	1,743	6,881	9,420	12,034
Sapling & seedling	30,379	213	336	3,706	1,719	5,627	6,443	1,877
All stands	386,235	213	960	5,763	5,432	13,712	23,873	16,412
Maple-birch								
Sawtimber	739,515	--	--	546	930	--	4,830	11,592
Poletimber	1,094,515	--	--	--	1,743	6,223	12,031	19,791
Sapling & seedling	94,873	173	1,160	3,862	4,151	12,855	14,199	14,650
All stands	1,928,903	173	1,160	4,408	6,824	19,078	31,060	46,033
Aspen								
Sawtimber	233,445	--	--	2,436	3,503	6,633	9,320	14,573
Poletimber	923,535	--	226	4,961	8,769	24,485	57,638	54,494
Sapling & seedling	158,438	1,237	7,351	16,229	19,974	27,159	23,431	15,656
All stands	1,315,418	1,237	7,577	23,626	32,246	58,277	90,389	84,723
Paper birch								
Sawtimber	33,319	--	--	--	--	1,091	--	--
Poletimber	247,256	--	--	680	3,028	1,701	19,926	5,019
Sapling & seedling	22,638	--	--	864	1,429	4,815	3,826	3,875
All stands	303,213	--	--	1,544	4,457	7,607	23,752	8,894
Exotic								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Nonstocked	5,834	902	914	303	1,144	316	1,315	829
All types								
Sawtimber	1,723,771	--	1,004	4,335	11,137	17,240	41,906	48,892
Poletimber	3,175,054	--	226	8,022	16,327	43,761	121,574	124,024
Sapling & seedling	406,731	2,072	10,800	32,704	40,095	69,511	63,114	42,439
Nonstocked	5,834	902	914	303	1,144	316	1,315	829
All stands	5,311,390	2,974	12,944	45,364	68,703	130,828	227,909	216,184

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack							
Sawtimber	--	--	--	4,872	--	--	--
Poletimber	—	6,966	1,712	6,232	1,211	--	--
Sapling & seedling	2,495	890	2,367	-	--	--	--
All stands	2,495	7,856	4,079	11,104	1,211	--	--
Oak-hickory							
Sawtimber	1,338	16,738	7,532	50,835	50,961	8,374	--
Poletimber	12,223	27,504	29,420	85,087	34,424	48,910	--
Sapling & seedling	1,148	1,909	--	71	--	--	--
All stands	14,709	46,151	36,952	135,993	85,385	57,284	--
Elm-ash-soft maple							
Sawtimber	655	12,734	1,628	26,131	53,547	21,313	--
Poletimber	28,623	37,360	31,710	27,478	49,611	16,020	2,602
Sapling & seedling	2,021	5,136	2,510	-	791	--	--
All stands	31,299	55,230	35,848	53,609	103,949	37,333	2,602
Maple-birch							
Sawtimber	25,494	41,149	49,778	142,535	265,907	163,237	33,517
Poletimber	56,290	103,865	87,240	311,259	343,847	144,685	7,541
Sapling & seedling	9,782	8,840	5,165	17,175	1,391	1,470	--
All stands	91,566	153,854	142,183	470,969	611,145	309,392	41,058
Aspen							
Sawtimber	16,886	27,706	14,360	30,371	92,679	14,978	--
Poletimber	70,768	131,078	84,656	171,083	228,357	74,631	12,389
Sapling & seedling	23,919	13,740	1,913	5,867	1,962	--	--
All stands	111,573	172,524	100,929	207,321	322,998	89,609	12,389
Paper birch							
Sawtimber	3,097	1,015	1,461	9,412	13,824	3,419	--
Poletimber	8,854	13,535	23,921	46,216	86,225	30,255	7,896
Sapling & seedling	846	1,690	2,549	2,744	--	--	--
All stands	12,797	16,240	27,931	58,372	100,049	33,674	7,896
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Nonstocked	--	--	111	--	--	--	--
All types							
Sawtimber	64,543	114,819	87,029	354,729	579,619	300,834	97,684
Poletimber	204,952	358,394	337,813	736,314	818,337	369,209	36,101
Sapling & seedling	56,552	36,775	17,156	26,862	5,154	3,497	--
Nonstocked	--	--	111	--	--	--	--
All stands	326,047	509,988	442,109	1,117,905	1,403,110	673,540	133,785

Table 37.--Net volume of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Northwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)						
		0-10	11-20	21-30	31-40	41-50	51-60	61-70
Jack pine								
Sawtimber	141,457	--	--	--	2,541	3,055	5,994	15,914
Poletimber	166,226	--	--	--	1,933	--	4,517	8,650
Sapling & seedling	23,831	--	--	1,419	3,288	4,935	4,572	--
All stands	331,514	--	--	1,419	7,762	7,990	15,083	24,564
Red pine								
Sawtimber	465,264	--	--	--	3,201	10,381	8,288	--
Poletimber	64,872	--	--	--	--	--	4,906	--
Sapling & seedling	6,566	--	--	--	5,045	--	--	--
All stands	536,702	--	--	--	8,246	10,381	13,194	--
White pine								
Sawtimber	252,829	--	--	--	5,132	--	2,742	--
Poletimber	18,518	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	271,347	--	--	--	5,132	--	2,742	--
Balsam fir								
Sawtimber	288,747	--	--	--	--	8,050	50,349	5,687
Poletimber	135,810	--	--	1,114	--	--	13,103	8,158
Sapling & seedling	36,126	--	--	2,233	776	5,610	4,454	5,747
All stands	460,683	--	--	3,347	776	13,660	67,906	19,592
White spruce								
Sawtimber	135,936	--	--	--	--	--	--	--
Poletimber	25,509	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	161,445	--	--	--	--	--	--	--
Black spruce								
Sawtimber	8,000	--	--	--	--	--	--	--
Poletimber	26,032	--	--	--	--	--	1,180	1,646
Sapling & seedling	12,059	--	--	1,344	--	6,416	2,197	503
All stands	46,091	--	--	1,344	--	6,416	3,377	2,149
Northern white-cedar								
Sawtimber	191,554	--	--	--	--	--	1,077	8,423
Poletimber	84,396	--	--	--	--	--	899	--
Sapling & seedling	2,945	--	--	--	--	--	1,621	--
All stands	278,895	--	--	--	--	--	3,597	8,423

(Table 37 continued on next page)

[1/] International 1/4-inch rule.

(Table 37 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine							
Sawtimber	30,576	24,372	4,426	48,596	5,983	--	--
Poletimber	9,785	14,948	78,489	46,089	1,815	--	--
Sapling & seedling	8,408	1,209	--	--	--	--	--
All stands	48,769	40,529	82,915	94,685	7,798	--	--
Red pine							
Sawtimber	--	4,016	29,716	118,325	120,601	147,447	23,289
Poletimber	993	6,725	3,284	18,338	14,841	15,785	--
Sapling & seedling	775	--	--	746	--	--	--
All stands	1,768	10,741	33,000	137,409	135,442	163,232	23,289
White pine							
Sawtimber	--	8,463	--	77,080	77,290	82,122	--
Poletimber	--	7,007	--	8,290	3,221	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	15,470	--	85,370	80,511	82,122	--
Balsam fir							
Sawtimber	20,971	11,910	7,938	63,120	96,790	18,028	5,904
Poletimber	2,037	21,166	6,207	14,001	34,075	30,635	5,314
Sapling & seedling	6,710	2,830	4,247	--	--	3,519	--
All stands	29,718	35,906	18,392	77,121	130,865	52,182	11,218
White spruce							
Sawtimber	--	--	--	--	--	37,464	98,472
Poletimber	--	--	--	--	13,869	11,640	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	13,869	49,104	98,472
Black spruce							
Sawtimber	--	--	--	--	8,000	--	--
Poletimber	6,388	2,294	2,630	2,603	9,291	--	--
Sapling & seedling	--	1,599	--	--	--	--	--
All stands	6,388	3,893	2,630	2,603	17,291	--	--
Northern white-cedar							
Sawtimber	11,612	5,447	11,505	--	55,107	42,410	55,973
Poletimber	1,182	6,861	--	49,510	12,519	13,425	--
Sapling & seedling	--	--	--	--	--	1,324	--
All stands	12,794	12,308	11,505	49,510	67,626	57,159	55,973

(Table 37 continued on next page)

(Table 37 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre) 0-10	11-20	21-30	31-40	41-50	51-60	61-70
Tamarack								
Sawtimber	28,640	--	1,439	--	--	4,586	3,130	4,509
Poletimber	21,591	--	--	--	--	2,204	1,460	1,212
Sapling & seedling	14,979	--	--	1,557	4,225	440	2,958	2,320
All stands	65,210	--	1,439	1,557	4,225	7,230	7,548	8,041
Oak-hickory								
Sawtimber	483,658	--	--	--	9,932	8,215	4,539	43,798
Poletimber	318,160	--	--	--	--	839	1,855	7,399
Sapling & seedling	48,414	--	702	5,370	17,428	15,497	4,410	--
All stands	850,232	--	702	5,370	27,360	24,551	10,804	51,197
Elm-ash-soft maple								
Sawtimber	413,334	--	3,394	5,101	7,158	3,115	29,541	8,276
Poletimber	311,211	--	--	--	3,500	10,092	14,703	5,841
Sapling & seedling	43,333	--	625	12,326	6,686	5,299	8,997	--
All stands	767,878	--	4,019	17,427	17,344	18,506	53,241	14,117
Maple-birch								
Sawtimber	2,358,137	--	--	1,833	3,636	--	18,003	38,485
Poletimber	1,584,330	--	--	--	2,976	8,594	9,292	25,100
Sapling & seedling	142,515	--	2,485	6,224	6,234	25,855	22,952	15,698
All stands	4,084,982	--	2,485	8,057	12,846	34,449	50,247	79,283
Aspen								
Sawtimber	691,033	--	--	8,390	11,743	17,878	29,107	47,832
Poletimber	918,332	--	--	4,620	7,919	20,988	34,706	39,950
Sapling & seedling	220,833	3,097	21,817	30,114	25,141	34,467	35,063	23,272
All stands	1,830,198	3,097	21,817	43,124	44,803	73,333	98,876	111,054
Paper birch								
Sawtimber	96,652	--	--	--	--	2,860	--	--
Poletimber	251,514	--	--	--	2,808	886	6,302	12,214
Sapling & seedling	17,643	--	--	1,183	686	702	4,761	2,645
All stands	365,809	--	--	1,183	3,494	4,448	11,063	14,859
Exotic								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Nonstocked	6,452	2,177	1,141	1,061	577	750	--	746
All types								
Sawtimber	5,555,241	--	4,833	15,324	43,343	58,140	152,770	172,924
Poletimber	3,926,501	--	--	5,734	19,136	43,603	92,923	110,170
Sapling & seedling	569,244	3,097	25,629	61,770	69,509	99,221	91,985	50,185
Nonstocked	6,452	2,177	1,141	1,061	577	750	--	746
All stands	10,057,438	5,274	31,603	83,889	132,565	201,714	337,678	334,025

(Table 37 continued on next page)

(Table 37 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack							
Sawtimber	--	--	--	14,976	--	--	--
Poletimber	--	8,716	2,597	4,047	1,355	--	--
Sapling & seedling	--	2,187	1,292	--	--	--	--
All stands	--	10,903	3,889	19,023	1,355	--	--
Oak-hickory							
Sawtimber	5,082	48,235	30,762	165,000	146,124	21,971	--
Poletimber	15,752	43,507	34,539	96,907	51,419	65,943	--
Sapling & seedling	874	4,133	--	--	--	--	--
All stands	21,708	95,875	65,301	261,907	197,543	87,914	--
Elm-ash-soft maple							
Sawtimber	2,449	30,549	6,903	89,989	167,142	59,717	--
Poletimber	41,791	65,170	44,126	33,097	64,801	25,634	2,456
Sapling & seedling	470	4,363	2,528	--	2,039	--	--
All stands	44,710	100,082	53,557	123,086	233,982	85,351	2,456
Maple-birch							
Sawtimber	86,388	149,970	152,789	483,828	810,293	521,255	91,657
Poletimber	67,128	164,647	141,652	430,225	545,848	180,769	8,099
Sapling & seedling	8,465	18,701	6,673	24,593	2,261	2,374	--
All stands	161,981	333,318	301,114	938,646	1,358,402	704,398	99,756
Aspen							
Sawtimber	54,243	87,052	44,684	84,517	266,707	38,880	--
Poletimber	75,123	153,227	88,477	191,003	230,011	68,307	4,001
Sapling & seedling	28,839	7,817	826	9,284	1,096	--	--
All stands	158,205	248,096	133,987	284,804	497,814	107,187	4,001
Paper birch							
Sawtimber	10,197	3,134	3,816	28,902	36,599	11,144	--
Poletimber	10,540	13,545	29,739	50,788	83,289	33,464	7,939
Sapling & seedling	--	2,402	613	4,651	--	--	--
All stands	20,737	19,081	34,168	84,341	119,888	44,608	7,939
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--	--
All types							
Sawtimber	221,518	373,148	292,539	1,174,333	1,790,636	980,438	275,295
Poletimber	230,719	507,813	431,740	944,898	1,066,354	445,602	27,809
Sapling & seedling	54,541	45,241	16,179	39,274	5,396	7,217	--
Nonstocked	--	--	--	--	--	--	--
All stands	506,778	926,202	740,458	2,158,505	2,862,386	1,433,257	303,104

Table 38.--Net volume of sawtimber on commercial forest land by species group and butt log grade, Northwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All grades	Log grade 1	2	3	Tie and timber
Softwoods					
Jack pine	403,480	--	--	403,480	--
Red pine	654,363	--	12,177	642,186	--
White pine	745,829	91,585	91,626	558,760	3,858
White spruce	368,931	2,898	2,355	363,678	--
Black spruce	33,543	--	--	33,543	--
Balsam fir	588,647	--	--	588,647	--
Hemlock	264,927	25,025	43,812	196,090	--
Tamarack	94,390	--	772	93,618	--
Northern white-cedar	388,516	--	22,430	366,086	--
Other softwoods	1,392	--	--	1,392	--
Total	3,544,018	119,508	173,172	3,247,480	3,858
Hardwoods					
White oak	202,018	9,651	33,206	139,673	19,488
Select red oak	846,693	76,618	215,878	491,026	63,171
Other red oak	100,877	--	21,007	79,870	--
Select hickory	--	--	--	--	--
Other hickory	9,661	--	--	6,744	2,917
Basswood	732,985	103,824	208,227	403,761	17,173
Beech	--	--	--	--	--
Yellow birch	221,270	30,969	76,696	110,771	2,834
Hard maple	905,072	84,792	158,329	645,155	16,796
Soft maple	498,562	40,366	68,819	367,283	22,094
Elm	411,041	47,725	136,983	216,311	10,022
Black ash	269,758	18,605	63,966	178,843	8,344
White & green ash	190,571	23,062	66,534	100,975	--
Sycamore	--	--	--	--	--
Cottonwood	--	--	--	--	--
Willow	720	--	328	392	--
Hackberry	--	--	--	--	--
Balsam poplar	17,149	--	7,824	9,325	--
Bigtooth aspen	530,658	12,250	74,590	437,892	5,926
Quaking aspen	1,255,261	30,439	153,541	968,392	102,889
Paper birch	293,605	--	30,465	249,615	13,525
Black cherry	14,138	--	7,592	6,546	--
Black walnut	--	--	--	--	--
Butternut	13,381	--	6,966	6,415	--
Other hardwoods	--	--	--	--	--
Total	6,513,420	478,301	1,330,951	4,418,989	285,179
All species	10,057,438	597,809	1,504,123	7,666,469	289,037

[1/] International 1/4-inch rule.

Table 39.--Net volume of short-log trees on commercial forest land by species group and diameter class, Northwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods											
Jack pine	3,594	866	230	2,498	--	--	--	--	--	--	--
Red pine	71	71	--	--	--	--	--	--	--	--	--
White pine	2,863	--	114	734	--	--	368	--	1,085	562	--
White spruce	441	--	441	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	899	632	--	267	--	--	--	--	--	--	--
Hemlock	2,768	492	287	722	111	364	650	--	--	142	--
Tamarack	429	--	222	207	--	--	--	--	--	--	--
Northern white-cedar	3,026	1,408	975	429	107	107	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	14,091	3,469	2,269	4,857	218	471	1,018	--	1,085	704	--
Hardwoods											
White oak	5,502	--	103	1,910	1,137	667	903	661	121	--	--
Select red oak	10,730	--	2,369	2,192	1,858	1,998	956	569	788	--	--
Other red oak	5,342	--	391	1,281	1,270	567	498	852	483	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	671	--	671	--	--	--	--	--	--	--	--
Basswood	4,761	--	1,421	1,214	943	597	--	418	168	--	--
Beech	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	5,114	--	1,193	1,039	1,217	674	120	--	871	--	--
Hard maple	15,623	--	1,989	4,960	4,002	1,439	1,083	583	1,567	--	--
Soft maple	7,280	--	1,494	2,370	1,305	1,317	134	507	153	--	--
Elm	7,441	--	1,493	1,729	1,441	1,191	293	109	745	440	--
Black ash	695	--	411	284	--	--	--	--	--	--	--
White & green ash	1,353	--	429	784	140	--	--	--	--	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	2,826	--	1,579	759	183	305	--	--	--	--	--
Quaking aspen	7,700	--	3,830	3,177	354	229	110	--	--	--	--
Paper birch	3,439	--	1,545	1,214	569	--	--	111	--	--	--
Black cherry	102	--	102	--	--	--	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--	--	--	--
Total	78,579	--	19,020	22,913	14,419	8,984	4,097	3,810	4,896	440	--
All species	92,670	3,469	21,289	27,770	14,637	9,455	5,115	3,810	5,981	1,144	--

Table 40.--Net volume of short-log trees on commercial forest land by species group and diameter class, Northwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height)									
		9.0 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 22.9	23.0- 28.9	29.0- 38.9	39.0+
Softwoods											
Jack pine	12,507	3,082	797	8,628	--	--	--	--	--	--	--
Red pine	298	298	--	--	--	--	--	--	--	--	--
White pine	10,605	--	352	2,396	--	--	1,375	--	4,233	2,249	--
White spruce	1,957	--	1,957	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	2,214	1,462	--	752	--	--	--	--	--	--	--
Hemlock	6,709	948	651	1,739	282	953	1,734	--	--	402	--
Tamarack	1,854	--	949	905	--	--	--	--	--	--	--
Northern white-cedar	10,302	4,612	3,385	1,516	387	402	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	46,446	10,402	8,091	15,936	669	1,355	3,109	--	4,233	2,651	--
Hardwoods											
White oak	14,269	--	301	5,077	2,950	1,689	2,283	1,665	304	--	--
Select red oak	23,757	--	5,190	4,820	4,086	4,439	2,130	1,283	1,809	--	--
Other red oak	12,238	--	911	2,893	2,906	1,284	1,149	1,966	1,129	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	1,835	--	1,835	--	--	--	--	--	--	--	--
Basswood	10,143	--	2,955	2,561	2,033	1,300	--	917	377	--	--
Beech	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	11,940	--	2,487	2,261	2,885	1,662	304	--	2,341	--	--
Hard maple	37,639	--	4,608	11,638	9,630	3,511	2,714	1,481	4,057	--	--
Soft maple	20,151	--	4,568	6,717	3,486	3,369	345	1,286	380	--	--
Elm	18,840	--	3,672	4,255	3,617	3,026	761	295	2,002	1,212	--
Black ash	2,112	--	1,319	793	--	--	--	--	--	--	--
White & green ash	3,263	--	1,075	1,873	315	--	--	--	--	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	4,504	--	2,469	1,216	303	516	--	--	--	--	--
Quaking aspen	17,015	--	8,167	7,165	843	564	276	--	--	--	--
Paper birch	9,378	--	4,198	3,259	1,590	--	--	331	--	--	--
Black cherry	312	--	312	--	--	--	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--	--	--	--
Total	187,396	--	44,067	54,528	34,644	21,360	9,962	9,224	12,399	1,212	--
All species	233,842	10,402	52,158	70,464	35,313	22,715	13,071	9,224	16,632	3,863	--

[1/] International 1/4-inch rule.

Table 41.--Net annual growth of growing stock on commercial forest land by softwoods and hardwoods, Northwest Unit, Wisconsin, 1967 and 1982

(In thousand cubic feet)

Species	1967[1/]	1982
Softwoods	43,000	49,537
Hardwoods	118,000	129,690
All species	161,000	179,227

[1/] Figures have been adjusted from those published after the 1968 survey to conform to 1982 volumes because of changes in survey procedures.

Table 42.--Net annual growth of growing stock on commercial forest land by species group and county, Northwest Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All counties	County					
		Ashland	Barron	Bayfield	Burnett	Douglas	Iron
Softwoods							
Jack pine	10,607	3	18	2,168	2,294	3,432	--
Red pine	8,768	693	15	2,398	1,430	749	194
White pine	4,234	622	107	1,174	222	176	171
White spruce	6,875	1,930	--	554	--	729	600
Black spruce	2,338	222	29	99	19	637	276
Balsam fir	11,877	1,685	--	1,224	-13	2,847	2,340
Hemlock	466	103	--	43	--	10	228
Tamarack	796	-61	22	148	49	38	133
Northern white-cedar	3,560	1,058	--	385	--	279	938
Other softwoods	16	--	--	--	--	--	5
Total	49,537	6,255	191	8,193	4,001	8,897	4,885
Hardwoods							
White oak	1,287	2	270	14	181	30	--
Select red oak	10,720	163	654	2,749	1,211	792	258
Other red oak	-194	--	14	-105	-80	-18	--
Select hickory	--	--	--	--	--	--	--
Other hickory	210	--	-1	--	11	--	--
Basswood	10,794	1,173	139	806	161	505	846
Beech	--	--	--	--	--	--	--
Yellow birch	1,174	102	2	47	3	66	92
Hard maple	18,495	4,038	115	2,880	82	900	2,629
Soft maple	22,289	2,666	423	3,373	377	1,590	1,382
Elm	2,978	431	146	296	114	115	447
Black ash	8,627	842	26	1,162	251	1,296	309
White & green ash	3,269	217	228	385	30	73	73
Sycamore	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--
Willow	4	--	--	--	4	--	--
Hackberry	--	--	--	--	--	--	--
Balsam poplar	198	--	--	19	--	144	26
Bigtooth aspen	8,194	501	62	1,765	973	510	235
Quaking aspen	26,291	3,117	836	4,387	918	3,324	1,093
Paper birch	14,620	1,787	450	3,161	523	2,412	870
Black cherry	562	55	17	--	42	--	61
Black walnut	--	--	--	--	--	--	--
Butternut	170	--	5	--	10	--	--
Other hardwoods	2	--	--	--	--	2	--
Total	129,690	15,094	3,386	20,939	4,811	11,741	8,321
All species	179,227	21,349	3,577	29,132	8,812	20,638	13,206

(Table 42 continued on next page)

(Table 42 continued)

Species group	County					
	Polk	Price	Rusk	Sawyer	Taylor	Washburn
Softwoods						
Jack pine	537	81	--	89	--	1,985
Red pine	7	1,098	449	1,141	122	472
White pine	85	121	263	892	174	227
White spruce	28	753	87	1,535	653	6
Black spruce	20	239	152	284	293	68
Balsam fir	--	1,732	353	971	603	135
Hemlock	--	-12	8	61	38	-13
Tamarack	42	53	-13	105	116	164
Northern white-cedar	--	530	12	211	54	93
Other softwoods	--	--	--	--	--	11
Total	719	4,595	1,311	5,289	2,053	3,148
Hardwoods						
White oak	350	5	118	137	4	176
Select red oak	1,043	276	854	1,291	426	1,003
Other red oak	-72	--	10	--	--	57
Select hickory	--	--	--	--	--	--
Other hickory	40	--	52	37	71	--
Basswood	449	926	1,473	2,226	1,302	788
Beech	--	--	--	--	--	--
Yellow birch	53	49	106	449	202	3
Hard maple	221	1,986	1,328	2,171	1,485	660
Soft maple	592	2,738	1,528	2,677	4,093	850
Elm	184	224	440	532	1	48
Black ash	334	1,296	678	1,014	937	482
White & green ash	414	283	397	593	417	159
Sycamore	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--
Willow	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	9
Bigtooth aspen	457	693	142	831	944	1,081
Quaking aspen	813	2,379	2,900	2,495	2,546	1,483
Paper birch	351	719	1,029	1,988	468	862
Black cherry	38	88	149	40	15	57
Black walnut	--	--	--	--	--	--
Butternut	116	--	30	13	4	-8
Other hardwoods	--	--	--	--	--	--
Total	5,383	11,662	11,234	16,494	12,915	7,710
All species	6,102	16,257	12,545	21,783	14,968	10,858

Table 43.--Net annual growth of sawtimber on commercial forest land by species group and county, Northwest Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All counties	County					
		Ashland	Barron	Bayfield	Burnett	Douglas	Iron
Softwoods							
Jack pine	32,952	109	612	7,739	5,283	13,949	--
Red pine	36,234	4,834	724	11,623	709	2,237	1,165
White pine	24,449	3,211	803	6,860	1,076	1,269	1,189
White spruce	25,900	7,544	--	3,559	--	3,564	3,152
Black spruce	1,324	179	--	--	--	158	584
Balsam fir	40,466	8,231	--	4,328	--	10,676	6,521
Hemlock	2,382	542	--	245	--	36	1,186
Tamarack	4,123	205	74	878	59	366	1
Northern white-cedar	18,269	6,558	--	1,250	--	1,066	4,082
Other softwoods	99	--	--	--	--	--	--
Total	186,198	31,413	2,213	36,482	7,127	33,321	17,880
Hardwoods							
White oak	5,331	5	1,832	23	1,178	9	--
Select red oak	43,540	1,015	3,551	9,576	5,720	2,713	225
Other red oak	5,156	--	59	50	2,681	31	--
Select hickory	--	--	--	--	--	--	--
Other hickory	166	--	20	--	--	--	--
Basswood	36,516	5,943	635	2,097	464	824	2,842
Beech	--	--	--	--	--	--	--
Yellow birch	3,607	311	--	115	--	146	150
Hard maple	34,046	7,341	343	4,505	288	2,059	3,468
Soft maple	26,531	4,669	147	1,670	1,021	1,445	626
Elm	13,119	1,765	732	787	440	143	1,434
Black ash	15,970	1,901	1,246	2,081	1,409	2,940	523
White & green ash	11,871	738	983	374	109	74	334
Sycamore	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--
Willow	16	--	--	--	16	--	--
Hackberry	--	--	--	--	--	--	--
Balsam poplar	470	--	--	116	--	323	31
Bigtooth aspen	31,043	858	414	7,635	3,898	3,877	302
Quaking aspen	80,988	8,880	1,621	17,796	4,634	11,925	5,483
Paper birch	26,972	3,953	103	5,524	688	5,902	2,339
Black cherry	1,038	251	22	--	101	--	253
Black walnut	--	--	--	--	--	--	--
Butternut	723	--	102	--	117	--	--
Other hardwoods	--	--	--	--	--	--	--
Total	337,103	37,630	11,810	52,349	22,764	32,411	18,010
All species	523,301	69,043	14,023	88,831	29,891	65,732	35,890

(Table 43 continued on next page)

[1/] International 1/4-inch rule.

(Table 43 continued)

Species group	County					
	Polk	Price	Rusk	Sawyer	Taylor	Washburn
Softwoods						
Jack pine	1,092	520	--	922	--	2,726
Red pine	40	4,352	1,115	6,636	881	1,918
White pine	516	631	1,525	5,303	1,049	1,017
White spruce	165	2,422	394	3,191	1,878	31
Black spruce	--	104	--	253	46	--
Balsam fir	--	2,994	1,372	3,664	2,161	519
Hemlock	--	-22	35	309	111	-60
Tamarack	185	1,284	122	163	303	483
Northern white-cedar	--	3,401	94	1,133	300	385
Other softwoods	--	--	--	--	--	99
Total	1,998	15,686	4,657	21,574	6,729	7,118
Hardwoods						
White oak	1,365	20	226	137	16	520
Select red oak	5,688	470	3,467	5,774	1,766	3,575
Other red oak	1,304	--	155	615	--	261
Select hickory	--	--	--	--	--	--
Other hickory	--	--	34	--	112	--
Basswood	1,390	3,825	5,273	6,323	6,164	736
Beech	--	--	--	--	--	--
Yellow birch	--	--	220	1,753	809	103
Hard maple	276	3,735	4,217	3,458	3,787	569
Soft maple	1,436	3,289	1,948	2,703	6,087	1,490
Elm	617	2,167	1,987	2,254	559	234
Black ash	223	946	2,043	1,743	614	301
White & green ash	1,175	1,631	1,213	2,244	2,700	296
Sycamore	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--
Willow	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--
Bigtooth aspen	1,743	1,684	688	5,641	1,892	2,411
Quaking aspen	1,789	5,341	7,027	7,161	3,062	6,269
Paper birch	200	1,580	1,027	2,917	1,378	1,361
Black cherry	--	252	106	53	--	--
Black walnut	--	--	--	--	--	--
Butternut	108	--	304	--	17	75
Other hardwoods	--	--	--	--	--	--
Total	17,314	24,940	29,935	42,776	28,963	18,201
All species	19,312	40,626	34,592	64,350	35,692	25,319

Table 44.--Net annual growth of growing stock on commercial forest land by ownership class and softwoods and hardwoods, Northwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Ownership class	All species	Softwoods	Hardwoods
National Forest	27,716	8,210	19,506
Miscellaneous federal	155	42	113
State	5,861	1,678	4,183
County and municipal	37,864	12,279	25,585
Indian	3,913	1,436	2,477
Forest industry	18,562	5,600	12,962
Farmer	14,926	2,881	12,045
Misc. private-corp.	8,148	2,488	5,660
Misc. private-indiv.	62,082	14,923	47,159
All owners	179,227	49,537	129,690

Table 45.--Net annual growth of growing stock on commercial forest land by species group and type, Northwest Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	10,607	8,020	142	23	--	--	--	--
Red pine	8,768	848	6,211	182	311	10	16	--
White pine	4,234	100	573	1,101	176	36	34	-13
White spruce	6,875	--	26	61	705	3,373	25	55
Black spruce	2,338	9	--	33	166	1	1,246	87
Balsam fir	11,877	7	48	73	2,190	69	120	685
Hemlock	466	--	--	--	-20	--	24	11
Tamarack	796	--	--	-19	69	--	-84	119
Northern white-cedar	3,560	--	20	--	586	44	159	1,855
Other softwoods	16	--	--	11	--	--	--	--
Total	49,537	8,984	7,020	1,465	4,183	3,533	1,540	2,799
Hardwoods								
White oak	1,287	--	--	-7	1	--	--	--
Select red oak	10,720	90	90	13	3	--	16	--
Other red oak	-194	26	--	-23	--	--	--	--
Select hickory	--	--	--	--	--	--	--	--
Other hickory	210	--	--	--	--	--	--	--
Basswood	10,794	2	--	14	--	--	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	1,174	--	--	--	-34	--	1	-38
Hard maple	18,495	--	32	--	34	2	6	--
Soft maple	22,289	--	118	34	222	13	22	2
Elm	2,978	--	3	-4	17	--	--	--
Black ash	8,627	--	--	--	566	3	--	632
White & green ash	3,269	--	5	--	6	14	--	--
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--
Willow	4	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	198	--	--	--	3	--	--	--
Bigtooth aspen	8,194	236	50	63	12	4	-7	--
Quaking aspen	26,291	173	107	313	-41	3	2	29
Paper birch	14,620	38	94	56	214	7	30	77
Black cherry	562	--	--	--	2	--	--	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	170	--	--	--	--	--	--	--
Other hardwoods	2	--	--	--	--	--	--	--
Total	129,690	565	499	459	1,005	46	70	702
All species	179,227	9,549	7,519	1,924	5,188	3,579	1,610	3,501

(Table 45 continued on next page)

(Table 45 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods								
Jack pine	17	1,465	11	21	815	24	--	69
Red pine	7	240	7	160	706	70	--	--
White pine	117	237	156	779	801	127	--	10
White spruce	19	--	226	597	1,438	342	--	8
Black spruce	378	--	30	78	215	95	--	--
Balsam fir	543	31	1,246	2,016	3,924	925	--	--
Hemlock	2	9	45	338	45	12	--	--
Tamarack	507	-1	118	-25	83	15	--	14
Northern white-cedar	11	--	318	406	125	36	--	--
Other softwoods	--	--	--	5	--	--	--	--
Total	1,601	1,981	2,157	4,375	8,152	1,646	--	101
Hardwoods								
White oak	--	722	56	224	253	30	--	8
Select red oak	--	5,195	123	2,857	1,839	494	--	--
Other red oak	--	-88	-14	16	-77	3	--	-37
Select hickory	--	--	--	--	--	--	--	--
Other hickory	--	22	4	172	12	--	--	--
Basswood	--	383	415	9,187	665	128	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	--	2	84	1,053	105	1	--	--
Hard maple	5	183	506	16,446	929	285	--	67
Soft maple	160	772	2,658	11,621	5,360	1,304	--	3
Elm	--	-7	974	1,507	438	50	--	--
Black ash	--	20	4,356	1,816	1,087	130	--	17
White & green ash	--	159	192	2,593	216	84	--	--
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--
Willow	--	--	4	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	--	-1	26	-5	179	-4	--	--
Bigtooth aspen	331	409	21	987	5,937	151	--	-
Quaking aspen	72	379	567	2,542	21,816	259	--	70
Paper birch	54	934	251	2,080	5,411	5,313	--	61
Black cherry	1	-15	5	324	214	31	--	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	--	24	--	155	-9	--	--	--
Other hardwoods	--	--	2	--	--	--	--	--
Total	623	9,093	10,230	53,575	44,375	8,259	--	189
All species	2,224	11,074	12,387	57,950	52,527	9,905	--	290

Table 46.--Net annual growth of sawtimber on commercial forest land by species group and type, Northwest Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All types	Forest type: Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	32,952	21,534	1,902	51	--	--	--	--
Red pine	36,234	2,398	24,321	1,112	1,517	--	721	--
White pine	24,449	798	2,951	5,780	997	216	113	-118
White spruce	25,900	--	124	341	3,634	10,167	120	332
Black spruce	1,324	--	--	--	392	59	411	165
Balsam fir	40,466	--	627	445	16,042	210	124	54
Hemlock	2,382	--	--	--	-107	--	132	46
Tamarack	4,123	--	--	70	294	--	1	427
Northern white-cedar	18,269	--	58	--	2,612	--	584	10,907
Other softwoods	99	--	--	99	--	--	--	--
Total	186,198	24,730	29,983	7,898	25,381	10,652	2,206	11,813
Hardwoods								
White oak	5,331	--	--	3	--	--	--	--
Select red oak	43,540	137	213	--	16	--	13	--
Other red oak	5,156	643	--	11	--	--	-3	--
Select hickory	--	--	--	--	--	--	--	--
Other hickory	166	--	--	--	--	--	--	--
Basswood	36,516	--	--	20	--	--	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	3,607	--	--	--	-151	--	5	-128
Hard maple	34,046	--	--	--	73	--	--	--
Soft maple	26,531	--	--	--	123	95	--	62
Elm	13,119	--	--	9	137	--	--	--
Black ash	15,970	--	--	--	1,544	11	--	10
White & green ash	11,871	--	--	--	--	--	--	--
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--
Willow	16	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	470	--	--	--	--	--	--	--
Bigtooth aspen	31,043	--	115	250	--	--	-15	-6
Quaking aspen	80,988	159	618	912	1,941	674	48	264
Paper birch	26,972	--	414	49	2,354	--	13	--
Black cherry	1,038	--	--	--	53	--	--	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	723	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--
Total	337,103	939	1,360	1,254	6,090	780	61	202
All species	523,301	25,669	31,343	9,152	31,471	11,432	2,267	12,015

(Table 46 continued on next page)

[1/] International 1/4-inch rule.

(Table 46 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods								
Jack pine	--	5,759	75	130	3,243	202	--	56
Red pine	38	529	43	1,065	4,116	374	--	--
White pine	808	1,369	1,211	4,642	4,601	757	--	324
White spruce	65	--	1,343	3,624	4,686	1,419	--	45
Black spruce	76	--	105	-13	110	19	--	--
Balsam fir	93	35	3,554	6,201	10,986	2,095	--	--
Hemlock	8	50	245	1,739	215	54	--	--
Tamarack	1,034	--	844	-8	736	99	--	626
Northern white-cedar	--	--	2,015	1,626	388	79	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	2,122	7,742	9,435	19,006	29,081	5,098	--	1,051
Hardwoods								
White oak	--	2,561	208	1,713	760	74	--	12
Select red oak	--	20,309	674	14,712	5,470	1,996	--	--
Other red oak	--	1,790	675	390	1,551	82	--	17
Select hickory	--	--	--	--	--	--	--	--
Other hickory	--	7	--	159	--	--	--	--
Basswood	--	462	1,042	34,317	556	119	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	--	--	565	3,349	-3	-30	--	--
Hard maple	--	215	366	32,878	401	113	--	--
Soft maple	36	595	5,984	17,424	1,988	224	--	--
Elm	--	-156	3,790	8,294	841	204	--	--
Black ash	--	194	8,733	4,115	1,169	194	--	--
White & green ash	--	975	1,284	9,242	251	119	--	--
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--
Willow	--	--	16	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	--	--	27	-34	499	-22	--	--
Bigtooth aspen	21	808	102	2,402	26,437	929	--	--
Quaking aspen	90	2,666	1,334	14,708	53,781	3,207	--	586
Paper birch	108	2,111	1,646	6,374	9,922	3,981	--	--
Black cherry	--	--	--	778	101	106	--	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	--	229	--	494	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--
Total	255	32,766	26,446	151,315	103,724	11,296	--	615
All species	2,377	40,508	35,881	170,321	132,805	16,394	--	1,666

Table 47.--Net annual growth of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Northwest Unit, Wisconsin, 1982

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	1,260	--	--	--	139	44	94	149	229	138	28	406	33	--	--
Poletimber	5,923	--	--	--	57	381	214	268	758	683	2,210	944	287	121	--
Sapling & seedling	2,366	15	--	240	214	171	152	108	1,304	162	--	--	--	--	--
All stands	9,549	15	--	240	410	596	460	525	2,291	983	2,238	1,350	320	121	--
Red pine															
Sawtimber	3,595	--	--	--	43	71	88	--	--	68	234	1,476	615	860	140
Poletimber	3,108	--	--	--	--	--	113	--	38	371	393	473	947	773	--
Sapling & seedling	816	-24	--	8	30	--	46	--	435	--	--	321	--	--	--
All stands	7,519	-24	--	8	73	71	247	--	473	439	627	2,270	1,562	1,633	140
White pine															
Sawtimber	1,704	--	--	--	41	--	38	--	--	71	--	784	364	406	--
Poletimber	220	--	--	--	--	--	--	--	--	33	--	72	115	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	1,924	--	--	--	41	--	38	--	--	104	--	856	479	406	--
Balsam fir															
Sawtimber	1,794	--	--	--	--	114	-48	26	-107	187	100	440	788	186	108
Poletimber	2,403	--	--	19	--	--	-1,045	621	48	693	163	353	646	760	145
Sapling & seedling	991	21	12	150	20	203	-56	135	313	55	94	--	--	44	--
All stands	5,188	21	12	169	20	317	-1,149	782	254	935	357	793	1,434	990	253
White spruce															
Sawtimber	1,323	--	--	--	--	--	--	--	--	--	--	--	--	248	1,075
Poletimber	2,165	--	--	--	--	--	--	--	--	--	--	--	1,921	244	--
Sapling & seedling	91	--	--	--	--	--	91	--	--	--	--	--	--	--	--
All stands	3,579	--	--	--	--	--	91	--	--	--	--	--	1,921	492	1,075
Black spruce															
Sawtimber	56	--	--	--	--	--	--	--	--	--	--	--	56	--	--
Poletimber	1,104	--	--	--	--	--	155	119	238	115	80	57	340	--	--
Sapling & seedling	450	--	6	27	10	-81	47	56	35	259	25	--	66	--	--
All stands	1,610	--	6	27	10	-81	202	175	273	374	105	57	462	--	--
Northern white-cedar															
Sawtimber	1,249	--	--	--	--	--	1	59	75	39	53	--	501	225	296
Poletimber	2,175	--	--	--	--	--	174	--	28	117	--	1,434	235	187	--
Sapling & seedling	77	--	-3	--	--	--	52	--	--	--	--	--	--	28	--
All stands	3,501	--	-3	--	--	--	227	59	103	156	53	1,434	736	440	296

(Table 47 continued on next page)

(Table 47 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	163	--	11	--	--	23	15	15	--	--	--	99	--	--	--
Poletimber	1,355	--	--	8	--	94	113	791	--	135	16	226	-28	--	--
Sapling & seedling	706	2	5	152	29	123	128	-5	175	24	73	--	--	--	--
All stands	2,224	2	16	160	29	240	256	801	175	159	89	325	-28	--	--
Oak-hickory															
Sawtimber	2,812	--	--	--	1	41	18	143	35	366	142	1,055	931	80	--
Poletimber	6,358	--	--	18	--	-9	19	204	257	1,114	1,176	2,057	269	1,253	--
Sapling & seedling	1,904	129	114	36	405	701	149	--	41	327	--	2	--	--	--
All stands	11,074	129	114	54	406	733	186	347	333	1,807	1,318	3,114	1,200	1,333	--
Elm-ash-soft maple															
Sawtimber	2,809	--	17	13	46	25	377	62	9	433	9	445	1,119	254	--
Poletimber	8,279	--	--	35	7	494	616	534	1,037	1,503	1,117	1,211	1,228	462	35
Sapling & seedling	1,299	-105	4	187	108	290	308	72	34	350	46	--	5	--	--
All stands	12,387	-105	21	235	161	809	1,301	668	1,080	2,286	1,172	1,656	2,352	716	35
Maple-birch															
Sawtimber	15,484	--	--	37	37	--	95	312	859	714	1,189	2,806	6,434	2,530	471
Poletimber	37,194	--	--	--	56	335	584	311	2,659	4,070	3,726	11,136	10,058	4,064	195
Sapling & seedling	5,272	62	24	54	146	662	1,062	966	714	586	310	564	49	73	--
All stands	57,950	62	24	91	239	997	1,741	1,589	4,232	5,370	5,225	14,506	16,541	6,667	666
Aspen															
Sawtimber	5,826	--	--	59	68	156	181	393	527	943	374	747	2,032	346	--
Poletimber	34,226	--	9	142	374	1,489	3,221	2,029	2,655	5,644	3,988	6,175	6,473	1,921	106
Sapling & seedling	12,475	1,402	846	1,080	2,009	1,570	2,097	829	1,482	867	80	191	22	--	--
All stands	52,527	1,402	855	1,281	2,451	3,215	5,499	3,251	4,664	7,454	4,442	7,113	8,527	2,267	106
Paper birch															
Sawtimber	882	--	--	--	--	176	--	--	57	26	44	191	342	46	--
Poletimber	7,595	--	--	52	71	35	527	133	287	492	654	1,961	2,333	820	230
Sapling & seedling	1,428	-45	--	40	54	180	320	160	23	64	351	281	--	--	--
All stands	9,905	-45	--	92	125	391	847	293	367	582	1,049	2,433	2,675	866	230
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	290	24	29	10	65	10	102	47	--	--	3	--	--	--	--
All types															
Sawtimber	38,957	--	28	109	375	650	859	1,159	1,684	2,985	2,173	8,449	13,215	5,181	2,090
Poletimber	112,105	--	9	274	565	2,819	4,691	5,010	8,005	14,970	13,523	26,099	24,824	10,605	711
Sapling & seedling	27,875	1,457	1,008	1,974	3,025	3,819	4,396	2,321	4,556	2,694	979	1,359	142	145	--
Nonstocked	290	24	29	10	65	10	102	47	--	--	3	--	--	--	--
All stands	179,227	1,481	1,074	2,367	4,030	7,298	10,048	8,537	14,245	20,649	16,678	35,907	38,181	15,931	2,801

Table 48.--Net annual growth of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Northwest Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	10,986	--	--	--	717	146	316	3,058	2,619	1,456	114	2,291	269	--	--
Poletimber	12,272	--	--	--	104	--	220	863	371	1,544	4,026	5,010	134	--	--
Sapling & seedling	2,411	47	--	57	139	327	293	--	1,455	93	--	--	--	--	--
All stands	25,669	47	--	57	960	473	829	3,921	4,445	3,093	4,140	7,301	403	--	--
Red pine															
Sawtimber	24,822	--	--	--	300	501	471	--	--	71	2,726	9,338	4,159	6,449	807
Poletimber	6,176	--	--	--	--	--	465	--	25	481	137	2,651	1,915	502	--
Sapling & seedling	345	54	--	--	224	--	--	--	43	--	--	24	--	--	--
All stands	31,343	54	--	--	524	501	936	--	68	552	2,863	12,013	6,074	6,951	807
White pine															
Sawtimber	8,408	--	--	--	324	--	110	--	--	240	--	3,633	1,877	2,224	--
Poletimber	744	--	--	--	--	--	--	--	--	305	--	308	131	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	9,152	--	--	--	324	--	110	--	--	545	--	3,941	2,008	2,224	--
Balsam fir															
Sawtimber	15,463	--	--	--	--	1,691	3,004	373	616	726	293	2,474	5,417	604	265
Poletimber	14,461	--	--	86	--	--	970	145	85	2,994	1,551	93	6,299	2,068	170
Sapling & seedling	1,547	--	-46	-55	24	292	-72	546	303	104	250	--	--	201	--
All stands	31,471	--	-46	31	24	1,983	3,902	1,064	1,004	3,824	2,094	2,567	11,716	2,873	435
White spruce															
Sawtimber	8,970	--	--	--	--	--	--	--	--	--	--	--	--	2,346	6,624
Poletimber	2,462	--	--	--	--	--	--	--	--	--	--	--	1,883	579	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	11,432	--	--	--	--	--	--	--	--	--	--	--	1,883	2,925	6,624
Black spruce															
Sawtimber	315	--	--	--	--	--	--	--	--	--	--	--	315	--	--
Poletimber	1,677	--	--	--	--	--	48	701	25	158	30	120	595	--	--
Sapling & seedling	275	--	--	29	--	106	93	8	--	39	--	--	--	--	--
All stands	2,267	--	--	29	--	106	141	709	25	197	30	120	910	--	--
Northern white-cedar															
Sawtimber	5,224	--	--	--	--	--	-7	432	279	131	236	--	2,503	1,036	614
Poletimber	6,707	--	--	--	--	--	479	--	55	284	--	4,963	351	575	--
Sapling & seedling	84	--	--	--	--	--	7	--	--	--	--	--	--	77	--
All stands	12,015	--	--	--	--	--	479	432	334	415	236	4,963	2,854	1,688	614

(Table 48 continued on next page)

[1/] International 1/4-inch rule.

(Table 48 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	814	--	68	--	--	133	101	97	--	--	--	415	--	--	--
Poletimber	992	--	--	--	--	399	109	93	--	278	37	105	-29	--	--
Sapling & seedling	571	--	--	63	96	17	191	117	--	60	27	--	--	--	--
All stands	2,377	--	68	63	96	549	401	307	--	338	64	520	-29	--	--
Oak-hickory															
Sawtimber	17,872	--	--	--	272	187	64	1,603	179	1,605	1,084	6,459	5,347	1,072	--
Poletimber	18,767	--	--	--	--	65	17	325	411	4,570	1,829	7,062	976	3,512	--
Sapling & seedling	3,869	314	110	89	1,786	1,175	274	--	36	85	--	--	--	--	--
All stands	40,508	314	110	89	2,058	1,427	355	1,928	626	6,260	2,913	13,521	6,323	4,584	--
Elm-ash-soft maple															
Sawtimber	15,493	--	66	61	170	50	1,702	652	13	943	59	2,653	8,226	898	--
Poletimber	16,311	--	--	--	59	308	1,263	280	2,238	4,421	2,256	2,364	2,517	468	137
Sapling & seedling	4,077	104	9	656	1,735	193	802	--	-80	84	503	--	71	--	--
All stands	35,881	104	75	717	1,964	551	3,767	932	2,171	5,448	2,818	5,017	10,814	1,366	137
Maple-birch															
Sawtimber	81,215	--	--	405	102	--	402	2,918	4,833	5,391	5,843	17,532	30,297	11,873	1,619
Poletimber	78,947	--	--	--	79	230	354	677	3,670	9,449	8,144	23,505	26,551	5,999	289
Sapling & seedling	10,159	72	799	124	256	1,993	1,862	1,245	329	1,210	236	1,775	169	89	--
All stands	170,321	72	799	529	437	2,223	2,618	4,840	8,832	16,050	14,223	42,812	57,017	17,961	1,908
Aspen															
Sawtimber	36,533	--	--	753	416	812	1,869	3,173	4,231	7,846	2,230	4,547	8,850	1,806	--
Poletimber	66,841	--	--	281	494	1,687	5,399	3,662	6,064	12,281	5,194	14,148	15,401	2,127	103
Sapling & seedling	29,431	4,905	4,655	3,275	2,210	4,630	3,987	2,291	2,498	407	59	498	16	--	--
All stands	132,805	4,905	4,655	4,309	3,120	7,129	11,255	9,126	12,793	20,534	7,483	19,193	24,267	3,933	103
Paper birch															
Sawtimber	3,734	--	--	--	--	103	--	--	320	186	211	1,076	1,428	410	--
Poletimber	11,312	--	--	--	176	-5	754	614	372	480	1,386	2,796	2,728	1,463	548
Sapling & seedling	1,348	--	--	27	671	14	199	214	--	106	11	106	--	--	--
All stands	16,394	--	--	27	847	112	953	828	692	772	1,608	3,978	4,156	1,873	548
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	1,666	435	583	45	564	22	--	17	--	--	--	--	--	--	--
All types															
Sawtimber	229,849	--	134	1,219	2,301	3,623	8,032	12,306	13,090	18,595	12,796	50,418	68,688	28,718	9,929
Poletimber	237,669	--	--	367	912	2,684	10,078	7,360	13,316	37,245	24,590	63,125	59,452	17,293	1,247
Sapling & seedling	54,117	5,496	5,527	4,265	7,141	8,747	7,636	4,421	4,584	2,188	1,086	2,403	256	367	--
Nonstocked	1,666	435	583	45	564	22	--	17	--	--	--	--	--	--	--
All stands	523,301	5,931	6,244	5,896	10,918	15,076	25,746	24,104	30,990	58,028	38,472	115,946	128,396	46,378	11,176

Table 49.--Current annual growing-stock removals on commercial forest land by species group and county, Northwest Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All counties	County					
		Ashland	Barron	Bayfield	Burnett	Douglas	Iron
Softwoods							
Jack pine	6,263	81	6	1,374	1,293	2,393	--
Red pine	4,150	896	15	752	296	710	157
White pine	2,104	336	69	449	71	75	126
White spruce	741	226	--	211	--	10	72
Black spruce	323	80	--	32	--	6	38
Balsam fir	2,921	865	--	457	2	133	170
Hemlock	743	45	--	27	--	--	22
Tamarack	323	72	--	15	3	--	2
Northern white-cedar	1,018	33	--	4	--	--	22
Other softwoods	--	--	--	--	--	--	--
Total	18,586	2,634	90	3,321	1,665	3,327	609
Hardwoods							
White oak	1,118	10	182	30	251	29	--
Select red oak	5,451	113	737	857	504	220	136
Other red oak	535	--	33	12	241	18	--
Hickory	65	--	--	--	--	--	--
Basswood	1,957	106	135	18	50	17	75
Beech	--	--	--	--	--	--	--
Yellow birch	1,191	175	4	154	6	12	115
Hard maple	6,877	853	133	890	51	64	527
Soft maple	2,664	294	90	265	71	54	228
Elm	5,158	839	114	297	187	72	385
Ash	2,703	192	111	658	243	142	96
Cottonwood	--	--	--	--	--	--	--
Balsam poplar	47	--	--	37	--	10	--
Bigtooth aspen	9,682	459	121	2,611	819	538	596
Quaking aspen	34,064	2,951	339	5,413	1,617	4,745	3,985
Paper birch	5,134	508	28	960	72	301	377
Black walnut	--	--	--	--	--	--	--
Other hardwoods[1/]	171	8	21	--	--	--	2
Total	76,817	6,508	2,048	12,202	4,112	6,222	6,522
All species	95,403	9,142	2,138	15,523	5,777	9,549	7,131

(Table 49 continued on next page)

[1/] Includes black cherry and butternut.

(Table 49 continued)

Species group	County					
	Polk	Price	Rusk	Sawyer	Taylor	Washburn
Softwoods						
Jack pine	125	91	--	215	--	685
Red pine	14	216	132	380	241	341
White pine	19	189	152	282	224	112
White spruce	--	85	1	78	23	35
Black spruce	--	62	--	53	18	34
Balsam fir	--	477	--	411	246	160
Hemlock	--	58	15	497	79	--
Tamarack	--	120	7	72	30	2
Northern white-cedar	--	897	--	31	31	--
Other softwoods	--	--	--	--	--	--
Total	158	2,195	307	2,019	892	1,369
Hardwoods						
White oak	360	22	90	32	41	71
Select red oak	604	362	860	366	348	344
Other red oak	153	--	28	6	--	44
Hickory	2	--	30	--	33	--
Basswood	113	609	399	222	197	16
Beech	--	--	--	--	--	--
Yellow birch	1	234	94	195	184	17
Hard maple	64	1,799	668	843	834	151
Soft maple	17	602	307	268	386	82
Elm	119	1,637	545	234	689	40
Ash	59	419	272	230	250	31
Cottonwood	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--
Bigtooth aspen	62	697	306	1,767	634	1,072
Quaking aspen	153	2,893	3,268	4,668	2,058	1,974
Paper birch	48	949	471	804	382	234
Black walnut	--	--	--	--	--	--
Other hardwoods[1/]	2	75	20	26	14	3
Total	1,757	10,298	7,358	9,661	6,050	4,079
All species	1,915	12,493	7,665	11,680	6,942	5,448

[1/] Includes black cherry and butternut.

Table 50.--Current annual sawtimber removals on commercial forest land by species group and county, Northwest Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All counties	County					
		Ashland	Barron	Bayfield	Burnett	Douglas	Iron
Softwoods							
Jack pine	9,315	137	9	2,782	1,645	2,952	--
Red pine	12,770	2,261	66	3,018	883	1,489	691
White pine	9,788	1,570	359	2,185	248	173	572
White spruce	2,656	618	--	897	--	52	371
Black spruce	154	38	--	--	--	6	40
Balsam fir	6,753	1,701	--	1,562	--	458	415
Hemlock	643	88	--	51	--	--	47
Tamarack	386	100	--	7	7	--	3
Northern white-cedar	1,293	49	--	7	--	--	38
Other softwoods	--	--	--	--	--	--	--
Total	43,758	6,562	434	10,509	2,783	5,130	2,177
Hardwoods							
White oak	3,934	30	822	95	792	33	--
Select red oak	20,781	376	3,258	2,753	1,583	671	549
Other red oak	2,243	--	104	6	1,014	30	--
Hickory	178	--	1	--	--	--	--
Basswood	7,003	463	416	92	53	37	280
Beech	--	--	--	--	--	--	--
Yellow birch	2,431	419	--	295	--	41	329
Hard maple	21,711	2,957	671	2,245	176	222	1,888
Soft maple	6,226	606	154	560	73	67	413
Elm	16,307	3,115	518	513	223	22	1,370
Ash	4,964	435	409	171	92	67	243
Cottonwood	--	--	--	--	--	--	--
Balsam poplar	51	--	--	34	--	17	--
Bigtooth aspen	30,821	996	729	7,810	2,185	1,921	1,541
Quaking aspen	83,522	7,080	980	13,225	3,534	11,008	12,207
Paper birch	5,413	348	47	1,124	203	283	522
Black walnut	--	--	--	--	--	--	--
Other hardwoods[2/]	225	19	81	--	2	--	4
Total	205,810	16,844	8,190	28,923	9,930	14,419	19,346
All species	249,568	23,406	8,624	39,432	12,713	19,549	21,523

(Table 50 continued on next page)

[1/] International 1/4-inch rule.

[2/] Includes black cherry and butternut.

(Table 50 continued)

Species group	County					
	Polk	Price	Rusk	Sawyer	Taylor	Washburn
Softwoods						
Jack pine	160	123	--	421	--	1,086
Red pine	66	598	528	1,028	966	1,176
White pine	102	980	775	1,363	997	464
White spruce	--	220	4	206	57	231
Black spruce	--	15	--	51	4	--
Balsam fir	--	909	2	820	437	449
Hemlock	--	144	31	103	179	--
Tamarack	--	136	11	79	39	4
Northern white-cedar	--	1,120	--	29	50	--
Other softwoods	--	--	--	--	--	--
Total	328	4,245	1,351	4,100	2,729	3,410
Hardwoods						
White oak	1,418	61	258	107	141	177
Select red oak	2,804	1,259	3,453	1,623	1,507	945
Other red oak	809	--	165	28	--	87
Hickory	--	--	68	--	109	--
Basswood	548	2,279	1,521	615	614	85
Beech	--	--	--	--	--	--
Yellow birch	--	459	218	191	425	54
Hard maple	341	4,913	2,483	2,501	2,846	468
Soft maple	83	1,641	785	581	1,054	209
Elm	554	4,823	2,035	791	2,219	124
Ash	284	1,122	721	648	719	53
Cottonwood	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--
Bigtooth aspen	326	1,653	1,412	5,986	2,891	3,371
Quaking aspen	682	8,194	8,653	10,153	4,044	3,762
Paper birch	37	760	265	985	547	292
Black walnut	--	--	--	--	--	--
Other hardwoods[2/]	8	23	26	39	17	6
Total	7,894	27,187	22,063	24,248	17,133	9,633
All species	8,222	31,432	23,414	28,348	19,862	13,043

[2/] Includes black cherry and butternut.

Table 51.--Average annual growing-stock removals on commercial forest land by species group and county, Northwest Unit, Wisconsin, 1967-1982

(In thousand cubic feet per year)

Species group	All counties	County					
		Ashland	Barron	Bayfield	Burnett	Douglas	Iron
Softwoods							
Jack pine	7,009	6	--	1,138	2,286	2,083	--
Red pine	335	3	--	162	--	--	91
White pine	1,261	7	--	259	80	43	--
White spruce	964	613	--	156	--	--	102
Black spruce	690	299	--	15	--	128	53
Balsam fir	3,959	1,673	--	26	--	407	220
Hemlock	1,805	235	--	1	--	--	859
Tamarack	767	38	118	13	--	--	--
Northern white-cedar	590	25	--	3	65	--	58
Other softwoods	--	--	--	--	--	--	--
Total	17,380	2,899	118	1,773	2,431	2,661	1,383
Hardwoods							
White oak	321	2	--	1	56	--	--
Select red oak	3,044	3	--	1,004	349	43	--
Other red oak	79	1	--	--	75	--	--
Hickory	--	--	--	--	--	--	--
Basswood	2,484	234	58	262	45	14	--
Beech	--	--	--	--	--	--	--
Yellow birch	1,208	4	--	50	--	--	450
Hard maple	5,004	1,402	--	720	--	--	85
Soft maple	3,115	374	64	1,238	49	71	74
Elm	4,154	937	--	65	142	115	74
Ash	2,031	276	--	778	251	139	--
Cottonwood	--	--	--	--	--	--	--
Balsam poplar	22	--	--	22	--	--	--
Bigtooth aspen	9,119	142	104	3,159	1,382	1,637	304
Quaking aspen	19,042	3,235	562	3,021	1,193	1,797	1,950
Paper birch	4,889	639	--	1,896	--	441	366
Black cherry	116	--	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--
Butternut	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--
Total	54,628	7,249	788	12,216	3,542	4,257	3,303
All species	72,008	10,148	906	13,989	5,973	6,918	4,686

(Table 51 continued on next page)

(Table 51 continued)

Species group	County					
	Polk	Price	Rusk	Sawyer	Taylor	Washburn
Softwoods						
Jack pine	570	27	--	548	2	349
Red pine	--	1	--	2	1	75
White pine	275	3	--	593	1	--
White spruce	--	4	--	3	52	34
Black spruce	--	27	--	54	12	102
Balsam fir	--	114	--	1,344	175	--
Hemlock	--	2	--	511	197	--
Tamarack	--	405	--	27	8	158
Northern white-cedar	--	426	--	10	3	--
Other softwoods	--	--	--	--	--	--
Total	845	1,009	--	3,092	451	718
Hardwoods						
White oak	237	2	--	1	--	22
Select red oak	1,040	53	259	34	--	259
Other red oak	--	2	--	1	--	--
Hickory	--	--	--	--	--	--
Basswood	149	962	222	74	464	--
Beech	--	--	--	--	--	--
Yellow birch	--	194	199	135	176	--
Hard maple	121	1,184	920	184	388	--
Soft maple	--	153	140	188	716	48
Elm	192	959	795	40	835	--
Ash	--	233	206	49	99	--
Cottonwood	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--
Bigtooth aspen	348	165	--	966	62	850
Quaking aspen	--	1,387	157	1,887	1,666	2,187
Paper birch	43	302	426	428	139	209
Black cherry	--	58	--	40	18	--
Black walnut	--	--	--	--	--	--
Butternut	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--
Total	2,130	5,654	3,324	4,027	4,563	3,575
All species	2,975	6,663	3,324	7,119	5,014	4,293

Table 52.--Average annual sawtimber removals on commercial forest land by species group and county, Northwest Unit, Wisconsin, 1967-1982

(In thousand board feet per year)[1/]

Species group	All counties	County					
		Ashland	Barron	Bayfield	Burnett	Douglas	Iron
Softwoods							
Jack pine	11,362	5	--	1,539	2,709	2,226	--
Red pine	1,885	--	--	929	--	--	524
White pine	6,469	2	--	1,416	266	--	--
White spruce	3,582	1,795	--	834	--	--	518
Black spruce	859	859	--	--	--	--	--
Balsam fir	9,806	3,594	--	2	--	1,476	207
Hemlock	6,096	1,065	--	--	--	--	4,166
Tamarack	2,001	4	638	1	--	--	--
Northern white-cedar	716	3	--	1	--	--	231
Other softwoods	--	--	--	--	--	--	--
Total	42,776	7,327	638	4,722	2,975	3,702	5,646
Hardwoods							
White oak	553	2	--	--	--	--	--
Select red oak	10,070	1	--	2,461	269	--	--
Other red oak	340	1	--	--	336	--	--
Hickory	--	--	--	--	--	--	--
Basswood	9,019	999	--	1,499	--	--	--
Beech	--	--	--	--	--	--	--
Yellow birch	4,827	2	--	281	--	--	2,609
Hard maple	13,484	4,268	--	984	--	--	271
Soft maple	2,137	526	--	540	--	--	--
Elm	16,812	4,483	--	2	--	208	381
Ash	4,071	1,553	--	408	--	--	--
Cottonwood	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--
Bigtooth aspen	21,740	--	572	9,546	3,248	--	1,687
Quaking aspen	42,820	7,779	1,846	8,464	1,178	2,627	2,914
Paper birch	13,332	3,467	--	6,215	--	733	654
Black cherry	379	--	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--
Butternut	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--
Total	139,584	23,081	2,418	30,400	5,031	3,568	8,516
All species	182,360	30,408	3,056	35,122	8,006	7,270	14,162

(Table 52 continued on next page)

[1/] International 1/4-inch rule.

(Table 52 continued)

Species group	County					
	Polk	Price	Rusk	Sawyer	Taylor	Washburn
Softwoods						
Jack pine	1,752	79	--	2,286	2	764
Red pine	--	--	--	--	--	432
White pine	1,611	1	--	3,173	--	--
White spruce	--	3	--	1	265	166
Black spruce	--	--	--	--	--	--
Balsam fir	--	256	--	3,952	319	--
Hemlock	--	--	--	--	865	--
Tamarack	--	1,185	--	3	1	169
Northern white-cedar	--	480	--	1	--	--
Other softwoods	--	--	--	--	--	--
Total	3,363	2,004	--	9,416	1,452	1,531
Hardwoods						
White oak	548	2	--	1	--	--
Select red oak	5.775	297	992	--	--	275
Other red oak	--	2	--	1	--	--
Hickory	--	--	--	--	--	--
Basswood	832	2,896	1,259	1	1,533	--
Beech	--	--	--	--	--	--
Yellow birch	--	365	1,144	1	425	--
Hard maple	704	1,003	3,797	666	1,791	--
Soft maple	--	278	--	6	787	--
Elm	988	4,496	3,118	3	3,133	--
Ash	--	566	898	12	634	--
Cottonwood	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--
Bigtooth aspen	1,919	293	--	3,470	340	665
Quaking aspen	--	2,155	303	4,947	4,404	6203
Paper birch	--	10	939	276	597	441
Black cherry	--	379	--	--	--	--
Black walnut	--	--	--	--	--	--
Butternut	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--
Total	10,766	12,742	12,450	9,384	13,644	7,584
All species	14,129	14,746	12,450	18,800	15,096	9,115

Table 53.--Current annual growing-stock and sawtimber removals on commercial forest land by species group, Northwest Unit, Wisconsin, 1967 and 1982

Species group	Growing stock		Sawtimber	
	1967	1982	1967	1982
	Thousand cubic feet		Thousand board feet[1/]	
Softwoods				
Jack pine	4,978	6,263	10,702	9,315
Red pine	560	4,150	1,739	12,770
White pine	693	2,104	3,466	9,788
White spruce	129	741	832	2,656
Black spruce	145	323	169	154
Balsam fir	1,705	2,921	6,141	6,753
Hemlock	1,204	743	6,036	643
Tamarack	110	323	358	386
Northern white-cedar	40	1,018	112	1,293
Other softwoods	--	--	--	--
Total	9,564	18,586	29,555	43,758
Hardwoods				
White oak	749	1,118	1,695	3,934
Select red oak	3,160	5,451	8,276	20,781
Other red oak	1,168	535	2,363	2,243
Hickory	197	65	365	178
Basswood	3,457	1,957	8,568	7,003
Beech	--	--	--	--
Yellow birch	1,079	1,191	3,912	2,431
Hard maple	6,110	6,877	13,593	21,711
Soft maple	3,456	2,664	5,514	6,226
Elm	3,166	5,158	8,609	16,307
Ash	3,526	2,703	6,672	4,964
Cottonwood	3	--	5	--
Balsam poplar	67	47	144	51
Bigtooth aspen	8,360	9,682	23,968	30,821
Quaking aspen	27,657	34,064	44,277	83,522
Paper birch	6,661	5,134	11,178	5,413
Black walnut	1	--	9	--
Other hardwoods[2/]	287	171	884	225
Total	69,104	76,817	140,032	205,810
All species	78,668	95,403	169,587	249,568

[1/] International 1/4-inch rule.

[2/] Includes black cherry and butternut.

Table 54.--Current annual growing-stock and sawtimber removals on commercial forest land by item and species category, Northwest Unit, Wisconsin, 1982

Item	Growing stock						Sawtimber					
	All species	Pine	Other softwoods	Aspen	Oak	Other hardwoods	All species	Pine	Other softwoods	Aspen	Oak	Other hardwoods
	Thousand cubic feet						Thousand board feet[1]					
Roundwood products												
Pulpwood[2]	57,660	8,203	2,618	33,417	873	12,549	116,604	12,150	4,260	77,298	2,033	20,863
Saw logs	17,692	3,278	1,319	4,258	2,894	5,943	90,677	17,763	5,617	21,470	15,426	30,401
Fuelwood	4,462	8	1	115	1,908	2,430	13,636	32	5	356	5,746	7,497
Posts	1,143	320	823	--	--	--	1,178	330	848	--	--	--
Veneer logs	2,213	3	--	1,751	178	281	14,341	25	--	11,319	1,141	1,856
Poles	115	115	--	--	--	--	462	462	--	--	--	--
Other	--	--	--	--	--	--	--	--	--	--	--	--
Total	83,285	11,927	4,761	39,541	5,853	21,203	236,898	30,762	10,730	110,443	24,346	60,617
Logging residue	5,164	370	256	2,462	476	1,600	7,607	693	578	2,067	1,172	3,097
Other removals	6,954	220	1,052	1,743	775	3,164	5,063	418	577	1,833	1,440	795
All removals	95,403	12,517	6,069	43,746	7,104	25,967	249,568	31,873	11,885	114,343	26,958	64,509

[1] International 1/4-inch rule.

[2] Includes particleboard and waferboard bolts.

Table 55.--Annual mortality of growing stock on commercial forest land by softwoods and hardwoods, Northwest Unit, Wisconsin, 1967 and 1982

(In thousand cubic feet)

Species	1967 1/	1982
Softwoods	7,000	10,298
Hardwoods	28,000	38,613
Total	35,000	48,911

1/ Figures have been adjusted from those published after the 1968 survey to conform to 1982 volumes because of changes in survey procedures.

Table 56.--Annual mortality of growing stock on commercial forest land by species group and cause, Northwest Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
Softwoods								
Jack pine	1,849	37	437	37	6	132	10	1,190
Red pine	42	--	--	--	--	15	--	27
White pine	398	--	49	--	1	47	--	301
White spruce	419	1	14	--	--	9	92	303
Black spruce	251	--	21	--	--	98	--	132
Balsam fir	5,688	716	331	--	3	1,680	40	2,918
Hemlock	469	1	19	--	9	47	4	389
Tamarack	930	22	169	--	--	59	--	680
Northern white-cedar	252	--	15	--	1	120	--	116
Other softwoods	--	--	--	--	--	--	--	--
Total	10,298	777	1,055	37	20	2,207	146	6,056
Hardwoods								
White oak	257	--	30	--	--	28	21	178
Select red oak	1,619	1	169	14	--	578	4	853
Other red oak	2,101	--	209	15	--	139	--	1,738
Select hickory	--	--	--	--	--	--	--	--
Other hickory	27	--	--	--	--	--	--	27
Basswood	1,434	10	80	--	12	85	48	1,199
Beech	--	--	--	--	--	--	--	--
Yellow birch	947	--	217	--	--	37	1	692
Hard maple	1,658	--	349	--	53	165	1	1,090
Soft maple	2,365	--	328	--	1	333	5	1,698
Elm	2,836	85	1,538	--	8	52	2	1,151
Black ash	974	--	20	--	2	93	1	858
White & green ash	116	--	6	--	--	11	--	99
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	146	--	23	--	--	--	--	123
Bigtooth aspen	3,595	19	714	55	11	433	1	2,362
Quaking aspen	18,962	15	3,928	--	181	2,552	100	12,186
Paper birch	1,353	--	143	--	--	72	1	1,137
Black cherry	194	--	61	--	--	14	14	105
Black walnut	--	--	--	--	--	--	--	--
Butternut	29	--	--	--	--	2	--	27
Other hardwoods	--	--	--	--	--	--	--	--
Total	38,613	130	7,815	84	268	4,594	199	25,523
All species	48,911	907	8,870	121	288	6,801	345	31,579

Table 57.--Annual mortality of sawtimber on commercial forest land by species group and cause, Northwest Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
Softwoods								
Jack pine	1,800	57	144	--	20	569	--	1,010
Red pine	157	--	--	--	--	86	--	71
White pine	1,590	3	238	--	4	300	--	1,045
White spruce	794	9	44	--	--	7	--	734
Black spruce	95	--	4	--	--	88	--	3
Balsam fir	8,939	74	1,161	--	6	2,646	3	5,049
Hemlock	1,935	8	89	--	33	210	14	1,581
Tamarack	793	--	91	--	--	6	--	696
Northern white-cedar	802	--	110	--	5	238	--	449
Other softwoods	--	--	--	--	--	--	--	--
Total	16,905	151	1,881	--	68	4,150	17	10,638
Hardwoods								
White oak	480	--	150	--	3	38	3	286
Select red oak	2,404	--	363	--	--	554	--	1,487
Other red oak	1,244	--	175	65	--	136	--	868
Select hickory	--	--	--	--	--	--	--	--
Other hickory	13	--	7	--	--	--	--	6
Basswood	2,526	24	223	--	38	261	--	1,980
Beech	--	--	--	--	--	--	--	--
Yellow birch	2,685	--	635	--	--	127	--	1,923
Hard maple	2,218	--	597	--	6	427	--	1,188
Soft maple	2,038	--	367	--	--	359	--	1,312
Elm	7,310	139	4,194	--	25	202	--	2,750
Black ash	974	--	19	--	--	127	--	828
White & green ash	236	--	17	--	--	5	--	214
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	262	--	52	--	--	--	--	210
Bigtooth aspen	7,157	96	1,381	--	42	1,887	--	3,751
Quaking aspen	24,658	--	6,241	--	140	4,406	--	13,871
Paper birch	664	--	120	--	--	63	--	481
Black cherry	23	--	--	--	--	--	--	23
Black walnut	--	--	--	--	--	--	--	--
Butternut	10	--	4	--	--	--	--	6
Other hardwoods	--	--	--	--	--	--	--	--
Total	54,902	259	14,545	65	254	8,592	3	31,184
All species	71,807	410	16,426	65	322	12,742	20	41,822

[1/] International 1/4-inch rule.

Table 58.--Annual mortality of growing stock and sawtimber on commercial forest land by county and softwoods and hardwoods, Northwest Unit, Wisconsin, 1982

County	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	- - - - Thousand cubic feet - - - -			- - - Thousand board feet[1/] - - - -		
Ashland	6,278	2,981	3,297	8,704	2,862	5,842
Barron	1,524	5	1,519	2,508	11	2,497
Bayfield	7,659	1,683	5,976	10,857	3,142	7,715
Burnett	3,277	428	2,849	4,392	712	3,680
Douglas	5,132	1,210	3,922	7,090	2,120	4,970
Iron	3,283	710	2,573	5,829	1,819	4,010
Polk	2,283	56	2,227	2,874	36	2,838
Price	5,057	1,302	3,755	8,933	3,279	5,654
Rusk	3,368	178	3,190	4,522	374	4,148
Sawyer	4,941	731	4,210	7,984	1,349	6,635
Taylor	2,874	527	2,347	3,966	638	3,328
Washburn	3,235	487	2,748	4,148	563	3,585
All counties	48,911	10,298	38,613	71,807	16,905	54,902

[1/] International 1/4-inch rule.

Table 59.--Annual mortality of growing stock and sawtimber on commercial forest land by ownership class and softwoods and hardwoods, Northwest Unit, Wisconsin, 1982

Ownership class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	- - - - Thousand cubic feet - - - -			- - - Thousand board feet[1/] - - -		
National Forest	8,289	4,650	3,639	11,949	5,241	6,708
Miscellaneous federal	45	--	45	85	--	85
State	1,509	241	1,268	2,641	498	2,143
County and municipal	10,439	1,774	8,665	15,023	4,093	10,930
Indian	1,235	173	1,062	2,400	647	1,753
Forest industry	3,777	800	2,977	5,846	1,731	4,115
Farmer	4,630	381	4,249	7,034	611	6,423
Misc. private-corp.	2,268	205	2,063	3,427	350	3,077
Misc. private-indiv.	16,719	2,074	14,645	23,402	3,734	19,668
All owners	48,911	10,298	38,613	71,807	16,905	54,902

[1/] International 1/4-inch rule.

Table 60.--Output of timber products by product, softwoods and hardwoods, and source of material, Northwest Unit, Wisconsin, 1981

Product	Standard units	Total		Roundwood products				Plant byproducts	
				Growing stock		Non-growing stock			
		No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet
Pulpwood[1]									
Softwoods	Standard[2]	189,292	14,941	137,109	10,821	31,259	2,467	20,924	1,653
Hardwoods	cords	731,595	57,793	592,931	46,839	108,753	8,591	29,911	2,363
Total		920,887	72,734	730,040	57,660	140,012	11,058	50,835	4,016
Saw logs									
Softwoods	Thousand[3]	25,790	4,773	24,839	4,597	951	176	--	--
Hardwoods	board feet	81,115	14,203	74,787	13,095	6,328	1,108	--	--
Total		106,905	18,976	99,626	17,692	7,279	1,284	--	--
Veneer logs									
Softwoods	Thousand[3]	27	3	27	3	--	--	--	--
Hardwoods	board feet	15,128	2,445	13,674	2,210	1,454	235	--	--
Total		15,155	2,448	13,701	2,213	1,454	235	--	--
Fuelwood									
Softwoods	Standard[2]	14,166	986	130	9	5,629	389	8,407	588
Hardwoods	cords	307,877	21,518	63,729	4,453	200,404	14,003	43,744	3,062
Total		322,043	22,504	63,859	4,462	206,033	14,392	52,151	3,650
Posts									
Softwoods	Thousand	1,238	1,272	1,112	1,143	126	129	--	--
Hardwoods	pieces	--	--	--	--	--	--	--	--
Total		1,238	1,272	1,112	1,143	126	129	--	--
Poles									
Softwoods	Pieces	13,617	115	13,617	115	--	--	--	--
Hardwoods		--	--	--	--	--	--	--	--
Total		13,617	115	13,617	115	--	--	--	--
Other[4]									
Softwoods	Thousand	705	705	--	--	--	--	705	705
Hardwoods	cubic feet	1,058	1,058	--	--	--	--	1,058	1,058
Total		1,763	1,763	--	--	--	--	1,763	1,763
All products									
Softwoods	Thousand	--	22,795	--	16,688	--	3,161	--	2,946
Hardwoods	cubic feet	--	97,017	--	66,597	--	23,937	--	6,483
Total		--	119,812	--	83,285	--	27,098	--	9,429

[1] Includes roundwood and plant byproducts used for particleboard and waferboard.

[2] 128 cubic feet of stacked wood including bark and air.

[3] International 1/4-inch rule.

[4] Other (industrial production) includes cabin logs, charcoal wood, shingle bolts, pilings, etc.

Table 61.--Output of roundwood products by product, softwoods and hardwoods, and source of material, Northwest Unit, Wisconsin, 1951

(In thousand cubic feet)

Product and species group	All sources	Growing-stock trees			Rough and rotten trees	Salvable dead trees	Other sources
		Total	Sawtimber	Poletimber			
Industrial products							
Saw logs							
Softwoods	4,773	4,597	4,246	351	--	13	163
Hardwoods	14,203	13,095	11,782	1,313	209	678	221
Subtotal	18,976	17,692	16,028	1,664	209	691	384
Veneer logs and bolts							
Softwoods	3	3	3	--	--	--	--
Hardwoods	2,445	2,210	2,210	--	231	--	4
Subtotal	2,448	2,213	2,213	--	231	--	4
Pulpwood[1/]							
Softwoods	13,288	10,821	4,547	6,274	176	1,014	1,277
Hardwoods	55,430	46,839	26,634	20,205	3,482	2,303	2,806
Subtotal	68,718	57,660	31,181	26,479	3,658	3,317	4,083
Cooperage							
Softwoods	--	--	--	--	--	--	--
Hardwoods	--	--	--	--	--	--	--
Subtotal	--	--	--	--	--	--	--
Piling							
Softwoods	--	--	--	--	--	--	--
Hardwoods	--	--	--	--	--	--	--
Subtotal	--	--	--	--	--	--	--
Poles							
Softwoods	115	115	96	19	--	--	--
Hardwoods	--	--	--	--	--	--	--
Subtotal	115	115	96	19	--	--	--
Mine timbers (Round)							
Softwoods	--	--	--	--	--	--	--
Hardwoods	--	--	--	--	--	--	--
Subtotal	--	--	--	--	--	--	--
Posts (Round and split)							
Softwoods	1,272	1,143	305	838	14	--	115
Hardwoods	--	--	--	--	--	--	--
Subtotal	1,272	1,143	305	838	14	--	115
Other							
Softwoods	--	--	--	--	--	--	--
Hardwoods	--	--	--	--	--	--	--
Subtotal	--	--	--	--	--	--	--
All industrial products							
Softwoods	19,451	16,679	9,197	7,482	190	1,027	1,555
Hardwoods	72,078	62,144	40,626	21,518	3,922	2,981	3,031
Total	91,529	78,823	49,823	29,000	4,112	4,008	4,586
Fuelwood							
Softwoods	398	9	6	3	1	269	119
Hardwoods	18,456	4,453	2,680	1,773	896	6,554	6,553
Total	18,854	4,462	2,686	1,776	897	6,823	6,672
All products							
Softwoods	19,849	16,688	9,203	7,485	191	1,296	1,674
Hardwoods	90,534	66,597	43,306	23,291	4,818	9,535	9,584
Total	110,383	83,285	52,509	30,776	5,009	10,831	11,258

[1/] Includes particleboard and waferboard bolts.

Table 62.--Timber products from roundwood by species group and product, Northwest Unit, Wisconsin, 1951

Table 62.--Timber products from roundwood by species group and product, Northwest Unit, Wisconsin, 1981

Species group	All products	Pulpwood[1]		Saw logs		Veneer logs	
	Thousand cubic feet	Cords	Thousand cubic feet	Thousand board feet[2]	Thousand cubic feet	Thousand board feet[2]	Thousand cubic feet
Softwoods							
Jack pine	8,117	91,961	7,258	3,616	759	--	--
Red pine	4,440	35,791	2,830	6,600	1,120	--	--
White pine	1,864	3,635	288	9,163	1,557	27	3
White spruce	731	4,236	334	1,764	370	--	--
Black spruce	193	1,122	88	467	98	--	--
Balsam fir	2,956	25,286	1,987	3,818	801	--	--
Hemlock	354	3,698	295	157	27	--	--
Tamarack	222	2,639	208	71	14	--	--
Northern white-cedar	972	--	--	134	27	--	--
Other softwoods	--	--	--	--	--	--	--
Total	19,849	168,368	13,288	25,790	4,773	27	3
Hardwoods							
White oak	1,631	2,242	173	2,998	521	12	2
Select red oak	7,766	10,907	856	13,044	2,286	1,086	177
Other red oak	840	1,180	93	1,412	247	117	19
Hickory	159	--	--	40	5	--	--
Basswood	2,317	6,073	478	7,222	1,286	451	71
Beech	92	3	3/	520	92	--	--
Yellow birch	1,700	15,601	1,230	798	142	310	49
Hard maple	9,211	51,717	4,092	8,525	1,422	437	69
Soft maple	3,662	25,454	2,012	2,483	442	66	8
Elm	9,856	40,265	3,183	13,130	2,342	424	66
Ash	2,713	20,148	1,592	3,060	544	137	20
Cottonwood	1	--	--	14	1	--	--
Balsam poplar	139	624	49	502	90	--	--
Bigtooth aspen	9,950	105,699	8,350	5,559	971	2,693	438
Quaking aspen	34,225	363,561	28,722	19,120	3,338	9,261	1,507
Paper birch	6,156	57,361	4,535	2,529	450	134	19
Black walnut	3	--	--	25	3	--	--
Other hardwoods[4]	113	849	65	134	21	--	--
Total	90,534	701,684	55,430	81,115	14,203	15,128	2,445
All species	110,383	870,052	68,718	106,905	18,976	15,155	2,448

(Table 62 continued on next page)

1/ Includes particleboard and waferboard bolts.

2/ International 1/4-inch rule.

3/ Less than 500 cubic feet.

4/ Includes butternut and black cherry.

(Table 62 continued)

Species group	Fuelwood		Posts		Poles		Other products
	Cords	Thousand cubic feet	Thousand pieces	Thousand cubic feet	Pieces	Thousand cubic feet	Thousand cubic feet
Softwoods							
Jack pine	1,432	100	--	--	--	--	--
Red pine	145	9	356	366	13,617	115	--
White pine	256	16	--	--	--	--	--
White spruce	390	27	--	--	--	--	--
Black spruce	103	7	--	--	--	--	--
Balsam fir	2,400	168	--	--	--	--	--
Hemlock	462	32	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--
Northern white-cedar	571	39	882	906	--	--	--
Other softwoods	--	--	--	--	--	--	--
Total	5,759	398	1,238	1,272	13,617	115	--
Hardwoods							
White oak	13,449	935	--	--	--	--	--
Select red oak	63,496	4,447	--	--	--	--	--
Other red oak	6,873	481	--	--	--	--	--
Hickory	2,218	154	--	--	--	--	--
Basswood	6,914	482	--	--	--	--	--
Beech	--	--	--	--	--	--	--
Yellow birch	4,047	279	--	--	--	--	--
Hard maple	51,896	3,628	--	--	--	--	--
Soft maple	17,225	1,200	--	--	--	--	--
Elm	60,945	4,265	--	--	--	--	--
Ash	7,985	557	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--
Balsam poplar	8	3/	--	--	--	--	--
Bigtooth aspen	2,739	191	--	--	--	--	--
Quaking aspen	9,423	658	--	--	--	--	--
Paper birch	16,501	1,152	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--
Other hardwoods 4/	414	27	--	--	--	--	--
Total	264,133	18,456	--	--	--	--	--
All species	269,892	18,854	1,238	1,272	13,617	115	--

3/ Less than 500 cubic feet.

4/ Includes butternut and black cherry.

Table 63.--Volume of primary plant residue by use and type of residue, Northwest Unit, Wisconsin, 1981

(In thousand cubic feet)

Use	Wood residue							
	Total		Coarse[1]		Fine[2]		Bark[3]	
	Softwoods	Hardwoods	Softwoods	Hardwoods	Softwoods	Hardwoods	Softwoods	Hardwoods
Fiber products[4]	1,074.3	1,728.0	1,074.2	1,532.8	0.1	195.2	2.6	4.5
Charcoal	2.0	307.3	1.9	296.8	0.1	10.5	1.3	191.7
Industrial fuel	222.9	2,384.1	67.8	1,076.0	155.1	1,308.1	641.6	1,940.6
Domestic fuel	365.6	678.0	365.0	458.1	0.6	219.9	162.8	179.0
Miscellaneous[5]	703.0	750.3	3.8	4.5	699.2	745.8	6.6	25.9
Not used[6]	102.1	169.9	44.2	120.7	57.9	49.2	91.5	126.6
Total	2,469.9	6,017.6	1,556.9	3,488.9	913.0	2,528.7	906.4	2,468.3

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark disposal at pulpmills.

[4] For manufacture of pulp, hardboard, or roofing felt.

[5] Livestock bedding, mulch, small dimension, and specialty items.

[6] Includes residue burned as waste.

Table 64.--All live tree biomass on commercial forest land by species group and forest type, Northwest Unit, Wisconsin, 1983

(In green tons)

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	13,757,750	10,907,368	196,250	71,175	--	--	--	--
Red pine	7,670,054	490,768	5,153,156	394,315	103,065	5,115	33,632	--
White pine	6,111,859	82,496	926,735	1,565,158	261,057	67,660	68,899	28,612
White spruce	4,320,786	--	33,882	76,756	452,990	2,127,550	19,997	90,612
Black spruce	3,532,999	5,867	--	44,514	153,589	13,790	2,139,698	140,430
Balsam fir	17,726,420	3,311	127,039	90,838	6,309,150	173,435	197,068	1,264,990
Hemlock	3,893,860	--	--	--	111,140	11,065	76,428	227,799
Tamarack	3,693,670	--	--	29,737	149,790	--	651,469	199,571
Northern white-cedar	5,114,620	--	11,680	--	825,172	67,493	145,203	2,706,169
Other softwoods	13,187	--	--	10,264	--	--	--	--
Total	65,835,205	11,489,810	6,448,742	2,282,757	8,365,953	2,466,108	3,332,394	4,658,183
Hardwoods								
White oak	6,403,223	82,689	21,736	14,778	4,679	--	--	--
Select red oak	26,674,786	223,500	327,167	41,875	21,486	--	28,849	--
Other red oak	4,439,817	433,167	62,403	59,324	--	--	4,434	--
Select hickory	--	--	--	--	--	--	--	--
Other hickory	817,493	--	--	--	--	--	--	--
Basswood	16,269,470	--	3,921	17,397	6,007	--	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	8,478,941	--	--	--	353,708	10,828	35,682	579,383
Hard maple	45,549,439	--	47,359	--	176,697	26,784	45,710	37,978
Soft maple	37,001,328	11,046	455,637	111,598	720,484	30,265	77,102	268,484
Elm	9,314,813	--	5,272	12,951	79,637	--	--	--
Black ash	14,093,907	--	579	--	590,499	7,989	--	490,502
White & green ash	4,546,973	--	5,370	--	6,558	24,474	--	--
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	822	--	--	--	--	--	--	--
Willow	35,790	--	--	--	6,290	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	472,205	--	--	--	4,267	--	--	--
Bigtooth aspen	13,047,344	119,190	128,486	58,297	19,033	7,554	15,390	9,077
Quaking aspen	47,334,734	429,192	421,681	407,761	1,066,826	66,955	99,612	89,643
Paper birch	25,137,267	43,256	250,646	85,090	638,753	23,295	74,777	171,126
Black cherry	2,177,195	1,036	--	--	71,810	--	--	3,761
Black walnut	8,023	--	--	--	--	--	--	--
Butternut	438,907	--	--	--	--	--	--	--
Other hardwoods	12,137	--	--	--	--	--	--	--
Noncommercial species	3,592,939	--	5,350	12,640	49,692	--	--	--
Total	265,847,553	1,343,076	1,735,607	821,711	3,816,426	198,144	381,556	1,649,954
All species	331,682,758	12,832,886	8,184,349	3,104,468	12,182,379	2,664,252	3,713,950	6,308,137

(Table 64 continued on next page)

(Table 64 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotics	Nonstocked
Softwoods								
Jack pine	24,312	1,537,322	15,701	25,964	811,265	77,671	--	90,722
Red pine	11,586	233,641	9,580	225,126	911,079	98,991	--	--
White pine	144,338	283,359	241,712	1,210,412	1,048,605	179,783	--	3,033
White spruce	33,755	--	117,183	450,431	707,112	204,351	--	6,167
Black spruce	614,282	--	83,362	86,076	187,917	63,474	--	--
Balsam fir	305,250	32,712	1,731,835	3,135,980	3,281,659	1,072,157	--	996
Hemlock	3,783	27,543	301,544	2,923,466	109,099	83,126	--	18,867
Tamarack	1,994,342	5,700	200,714	55,953	303,072	70,035	--	33,287
Northern white-cedar	32,054	--	627,054	538,612	129,449	31,734	--	--
Other softwoods	--	--	--	2,923	--	--	--	--
Total	3,163,702	2,120,277	3,328,685	8,654,943	7,489,257	1,881,322	--	153,072
Hardwoods								
White oak	--	3,034,801	333,338	1,191,979	1,458,360	250,112	--	10,751
Select red oak	--	12,793,195	395,299	7,102,542	4,399,555	1,341,318	--	--
Other red oak	--	2,500,322	138,643	300,587	748,723	131,577	--	60,637
Select hickory	--	--	--	--	--	--	--	--
Other hickory	--	161,612	22,385	592,817	40,679	--	--	--
Basswood	--	554,464	602,629	14,088,933	811,597	184,522	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	11,913	18,715	956,550	5,856,417	504,131	129,941	--	21,673
Hard maple	13,271	1,278,329	1,030,483	39,916,777	2,262,995	580,528	--	132,528
Soft maple	141,484	1,921,132	4,709,938	18,834,273	7,595,540	2,103,064	--	21,281
Elm	7,670	338,703	2,456,143	5,449,943	792,063	140,618	--	31,813
Black ash	20,521	156,355	7,947,902	3,526,865	1,009,196	312,119	--	31,380
White & green ash	--	271,123	332,605	3,512,041	234,692	160,110	--	--
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	822	--	--	--	--	--
Willow	--	--	8,198	11,050	10,252	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	--	4,318	67,491	41,921	341,874	12,334	--	--
Bigtooth aspen	98,971	1,587,001	83,218	1,362,351	8,955,181	596,224	--	7,371
Quaking aspen	178,327	926,236	1,538,576	6,410,954	33,587,192	1,929,075	--	182,704
Paper birch	248,721	1,545,191	702,677	4,589,466	7,733,127	8,985,150	--	45,992
Black cherry	11,837	146,614	79,160	1,097,958	620,826	103,627	--	40,566
Black walnut	--	--	--	8,023	--	--	--	--
Butternut	--	78,933	6,923	344,325	8,726	--	--	--
Other hardwoods	--	6,271	5,866	--	--	--	--	--
Noncommercial species	--	350,502	180,823	1,912,457	828,417	247,686	--	5,372
Total	732,715	27,673,817	21,599,669	116,151,679	71,943,126	17,208,005	--	592,068
All species	3,896,417	29,794,094	24,928,354	124,806,622	79,432,383	19,089,327	--	745,140

Table 65.--All live tree biomass by species group and tree biomass component, Northwest Unit, Wisconsin, 1983

(In green tons)

Species group	All components	Biomass component				
		All live 1- to 5-inch trees	Growing stock		Cull	
			Boles	Tops and limbs	Boles	Tops and limbs
Softwoods						
Jack pine	13,757,750	2,176,670	7,609,521	3,238,214	526,304	207,041
Red pine	7,670,054	693,034	4,814,788	2,074,267	61,522	26,443
White pine	6,111,859	307,812	3,721,056	1,606,336	332,663	143,992
White spruce	4,320,786	434,498	2,686,586	1,119,050	62,363	18,289
Black spruce	3,532,999	2,204,380	848,692	353,822	107,764	18,341
Balsam fir	17,726,420	5,120,100	8,557,069	3,537,137	396,637	115,477
Hemlock	3,893,860	69,132	2,207,338	933,004	486,729	197,657
Tamarack	3,693,670	1,103,072	1,694,892	711,979	134,524	49,203
Northern white-cedar	5,114,620	626,940	2,366,040	965,276	840,452	315,912
Other softwoods	13,187	--	9,279	3,908	--	--
Total	65,835,205	12,735,638	34,515,261	14,542,993	2,948,958	1,092,355
Hardwoods						
White oak	6,403,223	574,364	3,050,691	1,264,699	1,102,011	411,458
Select red oak	26,674,786	1,283,896	15,676,248	6,642,616	2,175,517	896,509
Other red oak	4,439,817	151,914	1,709,730	714,336	1,358,236	505,601
Select hickory	--	--	--	--	--	--
Other hickory	817,493	141,516	400,189	170,105	80,743	24,940
Basswood	16,269,470	799,378	9,784,105	4,145,454	1,100,584	439,949
Beech	--	--	--	--	--	--
Yellow birch	8,478,941	739,138	3,269,882	1,367,331	2,250,602	851,988
Hard maple	45,549,439	7,526,665	20,104,517	8,515,846	6,804,001	2,598,410
Soft maple	37,001,328	9,409,836	14,599,455	6,202,839	5,004,810	1,784,388
Elm	9,314,813	679,829	5,089,631	2,117,019	1,031,080	397,254
Black ash	14,093,907	2,351,888	7,407,553	3,097,957	948,355	288,154
White & green ash	4,546,973	253,755	2,669,745	1,135,504	352,189	135,780
Sycamore	--	--	--	--	--	--
Cottonwood	822	822	--	--	--	--
Willow	35,790	--	5,789	2,409	21,234	6,358
Hackberry	--	--	--	--	--	--
Balsam poplar	472,205	101,923	230,089	98,935	28,816	12,442
Bigtooth aspen	13,047,344	915,895	7,694,142	3,341,992	783,444	311,871
Quaking aspen	47,334,734	6,074,439	24,590,710	10,576,858	4,338,066	1,754,661
Paper birch	25,137,267	3,161,542	13,758,213	5,851,178	1,739,463	626,871
Black cherry	2,177,195	321,896	694,705	296,074	617,720	246,800
Black walnut	8,023	--	--	--	5,616	2,407
Butternut	438,907	29,573	169,276	71,989	117,908	50,161
Other hardwoods	12,137	--	4,141	1,725	4,433	1,838
Noncommercial species	3,592,939	--	--	--	3,351,062	241,877
Total	265,847,553	34,518,269	130,908,811	55,614,866	33,215,890	11,589,717
All species	331,682,758	47,253,907	165,424,072	70,157,859	36,164,848	12,682,072

Table 66.--Sampling errors[1/] for estimates smaller than the Unit totals of volume, net growth, removals, and area of commercial forest land, Northwest Unit, Wisconsin, 1983

Sampling error	Commercial forest land	Growing stock			Sawtimber		
		Inventory	Growth	Removals	Inventory	Growth	Removals
Percent	Thousand acres	- - - -Thousand cubic feet- - - -			- - - -Thousand board feet[2/] - - -		
1	677.8	11,945,209	828,191	19,045,163	67,150,869	5,948,281	76,363,039
2	169.4	2,986,302	207,048	4,761,291	16,787,717	1,487,070	19,090,760
3	75.3	1,327,245	92,021	2,116,129	7,461,208	660,920	8,484,782
4	42.4	746,576	51,762	1,190,323	4,196,929	371,768	4,772,690
5	27.1	477,808	33,128	761,807	2,686,035	237,931	3,054,522
10	6.8	119,452	8,282	190,452	671,509	59,483	763,630
15	3.0	53,090	3,681	84,645	298,448	26,437	339,391
20	1.7	29,863	2,070	47,613	167,877	14,871	190,908
25	1.1	19,112	1,325	30,472	107,441	9,517	122,181
50	0.3	4,778	331	7,618	26,860	2,379	30,545
100	0.1	1,195	83	1,905	6,715	595	7,636

[1/] At the 68-percent probability level.

[2/] International 1/4-inch rule.

Table 67.--Sampling errors for county totals of growing-stock volume, net growth, removals, and area of commercial forest land, Northwest Unit, Wisconsin, 1983

(Percent of estimate)

County	Commercial forest land	Growing stock		
		Inventory	Growth	Removals
Ashland	1.16	4.29	6.07	41.01
Barron	2.07	9.10	14.75	85.50
Bayfield	0.96	3.74	5.24	38.07
Burnett	1.46	6.55	9.53	69.60
Douglas	1.04	4.68	6.24	78.36
Iron	1.34	5.20	7.80	58.73
Polk	1.75	7.53	11.32	60.03
Price	1.11	5.01	6.88	56.62
Rusk	1.37	5.71	7.94	63.96
Sawyer	1.06	4.28	5.98	47.66
Taylor	1.38	5.78	7.17	58.11
Washburn	1.44	6.05	8.62	74.74
All counties	0.36	1.50	2.10	16.29

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Smith, W. Brad.
Timber resource of Wisconsin's Northwest Survey Unit, 1983. Resour. Bull. NC-73. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1984. 97 p.

The fourth inventory of the timber resource of the Northwest Wisconsin Survey Unit shows a 1.8 percent decline in commercial forest area and a 36 percent gain in growing-stock volume between 1968 and 1983. Presented are highlights and statistics on area, volume, growth, mortality, removals, utilization, and biomass.

KEY WORDS: Statistics, area, volume, growth, mortality, and removals.

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United States Department of Agriculture

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North Central Forest Experiment Station

Resource Bulletin **NC-74**

Eastern South Dakota Forest Statistics, 1980

Gerhard K. Raile

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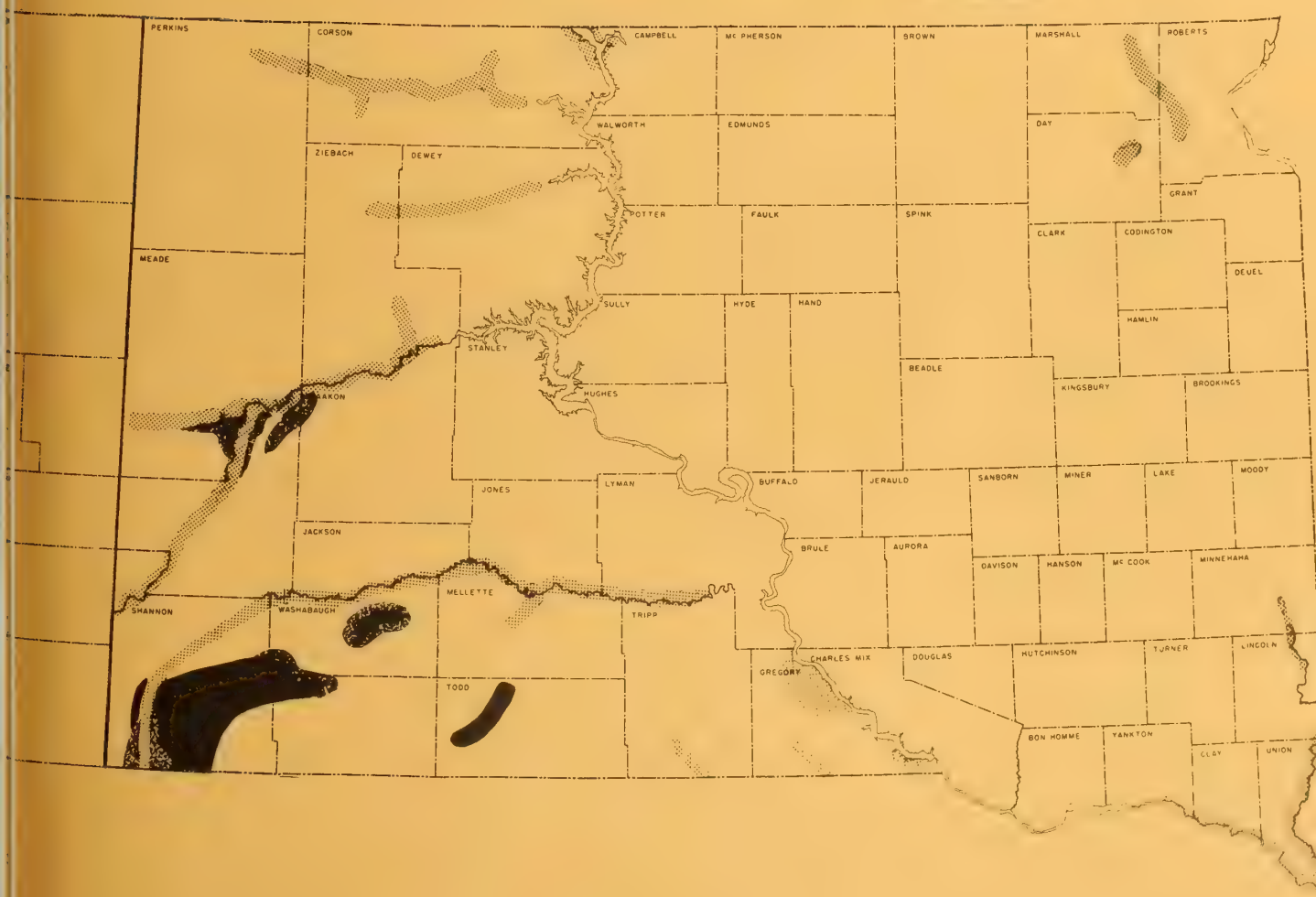

Information contained in this report includes the most commonly used Forest Inventory and Analysis (FIA) statistics. However, additional forest resource data can be provided to interested users. Persons requesting additional information that can be provided from the raw inventory data are expected to pay for the retrieval costs. These costs will vary depending on the complexity of the request, from less than $100 for a simple request to $2,000 for a complete retrieval involving the services of an FIA computer programmer. If requests for data conflict with ongoing work, they will be scheduled so as to minimize the impact on the work unit.

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FOREWORD

Forest Inventory and Analysis (FIA) is a continuing endeavor as mandated by the Forest and Rangeland Renewable Resources Planning Act of 1974. Prior inventories were mandated by the McSweeney-McNary Forest Research Act of 1928. The objective of FIA is to periodically inventory the Nation's forest land to determine its extent, condition, and volume of timber, growth, and depletions. Up-to-date resource information is essential to frame intelligent forest policies and programs. USDA Forest Service regional experiment stations are responsible for conducting these inventories and publishing summary reports for individual States. The North Central Forest Experiment Station is responsible for Forest Inventory and Analysis work in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, and Wisconsin.

Fieldwork for the 1980 eastern South Dakota[1] Forest Survey began in June 1980 and was completed in July 1980. Previous surveys of eastern South Dakota timber resources are dated 1935 and 1965. Eastern South Dakota is the land east of the 103rd meridian as shown on the front cover map.

The forest resources of western South Dakota[2] were surveyed in 1983 by the Intermountain Forest and Range Experiment Station, Odgen, Utah. A report analyzing the timber resources of the entire State will be published by that Station.

Aerial photos used in this Inventory were furnished by USDA Agricultural Stabilization and Conservation Service, Huron, South Dakota.

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[1] *East of the 103rd meridian.*

[2] *West of the 103rd meridian.*

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EASTERN SOUTH DAKOTA FOREST STATISTICS, 1980

Gerhard K. Raile, *Mensurationist*

HIGHLIGHTS

Area

- Forest land area totaled 266,300 acres—0.6 percent of the Unit's total land area.
- Fifty-five percent of the Unit's forest land is unproductive forest.
- Commercial forest land decreased by 31 percent between 1965 and 1980, from 165,400 to 113,600 acres.
- Farmer and Indian owners account for 91 percent of the Unit's commercial forest land—farmers alone own 57 percent.
- Seventy-two percent of the commercial forest land is in the elm-ash (45,500 acres), cottonwood (18,500 acres), and ponderosa pine (17,800 acres) forest types.
- Sawtimber stands account for 42 percent of the commercial forest followed by poletimber stands (23 percent), sapling and seedling stands (22 percent), and nonstocked areas (13 percent).
- Stands between 30 and 81 years of age occupy 49 percent of the commercial forest.
- Fifty-eight percent of the commercial forest is poorly stocked with growing-stock trees (16.7 to 60 percent), 21 percent is medium stocked (61 to 100 percent), and 9 percent is well stocked (101 to 133 percent).
- Wooded strips occupy 160,000 acres. Wooded strips do not include windbreaks and would be commercial forest except for width.
- Windbreaks amount to 127,800 acres and are part of the 601,100 acres of nonforest land with trees in the Unit.

Volume

- The total volume of timber on commercial forest land in 1980 was 76.9 million cubic feet—51.9 million in growing-stock trees, 22.7 million in rough and rotten trees, and 2.3 million in salvable dead trees.
- Growing-stock volume decreased 42 percent from 89.6 million cubic feet in in 1965 to 51.9 million cubic feet in 1980.
- Growing-stock volume per acre decreased 16 percent from 541.7 cubic feet in 1965 to 456.9 cubic feet in 1980.
- Sawtimber volume per acre decreased 10 percent from 1,728 board feet to 1,553 board feet in 1980.
- Elm growing stock took a drastic drop due to Dutch elm disease—from 15.6 million cubic feet in 1965 to 3.9 million cubic feet in 1980. The drop in elm sawtimber volume was even more significant—from 58.0 million board feet in 1965 to 7.8 million board feet in 1980.
- Cottonwood is the species with the most sawtimber volume on commercial forest land (44 percent of the total), followed by ponderosa pine (22 percent) and ash (18 percent).
- Farmers own 57 percent of the growing-stock volume (29.7 million cubic feet), and Indians own 33 percent (17.3 million cubic feet).
- The elm-ash type accounts for 35 percent of the growing-stock volume, the cottonwood type for 31 percent, and the ponderosa pine type for 21 percent.
- The cottonwood type has the most sawtimber volume per acre with 3,659 board feet.
- Sawtimber volume by butt log grade is concentrated in log grade 3 (64 percent of sawtimber volume).

Stand Conditions

- Net annual growth of growing stock amounted to 1.5 million cubic feet in 1979, 2.8 percent of inventory.
- Sawtimber growth was 7.5 million board feet in 1979, 4.3 percent of inventory.
- Mortality of growing-stock trees totaled 176,000 cubic feet in 1979, 0.3 percent of inventory.

- Disease accounts for 57 percent of the mortality.

Timber Use

- Timber removals from growing stock totaled 1,762,000 cubic feet in 1979—679,000 for roundwood products, 57,000 for logging residue, and 1,026,000 for other removals.
- Removals of growing stock for 1979 are 45 percent lower than those in 1964.
- Farmers and miscellaneous private individuals owned 98 percent of the 1979 growing-stock removals.
- Sawtimber removals from commercial forest land totaled 5.6 million board feet in 1979, 41 percent lower than in 1964.
- Growing-stock removals for roundwood products totaled 679,000 cubic feet, 50 percent as firewood and 45 percent as saw logs.
- Wood residue from primary plants amounted to 116,100 cubic feet—23 percent of it was not used.

Biomass

- Live tree biomass (trees greater than 1 inch in d.b.h.) totaled 3.7 million green tons, or 32 tons per acre of commercial forest land.
- Highest yields per acre of live tree biomass are in the cottonwood type (49 tons) and the oak type (34 tons).
- Sixty percent of the live tree biomass is in the boles of trees greater than 5 inches d.b.h., 31 percent is in the tops and limbs of these trees, and 9 percent is in trees less than 5 inches d.b.h.

APPENDIX

ACCURACY OF SURVEY

Forest Inventory and Analysis information is based on a sampling procedure designed to provide reliable statistics at the State level. Consequently, the reported figures are estimates only. The sampling errors shown below mean the chances are two out of three that the true inventory value is within the limits indicated.

For example, the estimated growing-stock volume in eastern South Dakota in 1980, 51.9 million cubic feet, has a sampling error of ±40.48 percent (±21.0 million cubic feet). Therefore, the growing-stock volume from a 100-percent inventory would have a two in three chance of falling between 30.9 and 72.9 million cubic feet.

The following tabulation shows the sampling errors for the 1980 eastern South Dakota Inventory:

Item	Unit totals	Sampling errors
Growing stock	(Million cubic feet)	(Percent)
Volume	51.9	40
Growth	1.5	53
Removals	1.8	27
Sawtimber	(Thousand board feet)	
Volume	176,400	30
Growth	7,548	46
Removals	5,571	25
Commercial forest area	(Thousand acres) 113.6	38

As survey data are broken down into sections smaller than Unit totals, the sampling error increases. The smaller the breakdown, the larger the sampling error. For example, the sampling error for growing-stock volume in a particular county is higher than that for total growing-stock volume in the Unit (table 69 shows the sampling errors for smaller estimates).

SURVEY PROCEDURE

The major steps in the survey of eastern South Dakota were as follows:

1. A total of 222,070 1-acre points were systematically distributed across aerial photos of the entire State. Photo interpretors classified these points as forest land (2,206), nonforest land with trees (2,170), nonforest land without trees (213,372), questionable (501), and water (3,713), in order to make a preliminary estimate of forest area. Next, all of the forest, nonforest with trees, and questionable points were stereoclassified as to forest type, stand-size class, and density. Then 254 points classed as forest, 69 points classed as questionable, and 248 points classed as nonforest with trees were examined on the ground to correct the preliminary area estimate for errors in classification and for actual changes in land use since the photos were taken. At each of 74 commercial forest locations, variable-radius plots (basal area factor 37.5) were established at 10 points uniformly placed over the sample acre. Twenty-four of these 74 locations were plots established during the 1965 survey and remeasured during the 1980 survey to provide improved growth and mortality information. Tree measurements made at commercial forest locations were the basis for estimates of timber volume, growth, mortality, number of trees, and other forest classifications.

2. Growth and mortality on commercial forest land were estimated using data collected on remeasurement plots (those established in 1965 and remeasured in 1980) and on new plots established in 1980. On

remeasurement plots growth was calculated as the observed change in volume on surviving trees. On new plots the remeasurement data and the Stand and Tree Evaluation and Modeling System (STEMS)[3] were used to estimate growth. STEMS is a system of computer programs that projects the growth of individual trees in stands. Mortality was measured on remeasurement plots as the observed volume in trees that died between surveys. On new plots, mortality was estimated by determining the volume in trees that died within 3 years of plot establishment. Growth and mortality were converted to an annual basis.

3. Statistics on timber utilization during 1979 were obtained from mill surveys. The South Dakota Department of Wildlife, Parks, and Forestry (SDDWPF) canvassed resident sawmills and other primary wood-using plants. The North Central Forest Experiment Station canvassed out-of-State primary wood-using mills such as sawmills and veneer mills to determine their use of timber from South Dakota. The SDDWPF canvassed 1,343 randomly selected households to estimate 1979 fuelwood and post production from roundwood. Estimates of primary mill residue used for fuelwood were obtained from the canvass of South Dakota primary wood-using plants. Timber cut for products by ownership class was determined by a canvass of public and industrial timber owners. The portion of timber cut unaccounted for by the latter owners was grouped under "farmer and other owners".

4. Wood utilization factors for converting timber products output to timber removals for saw logs were obtained during the 1975-1976 Minnesota utilization study. Factors for fuelwood and posts were obtained during the 1964 South Dakota utilization study.

5. Field data were sent to St. Paul, Minnesota for processing and analysis.

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[3] *Belcher, David M.; Holdaway, Margaret R.; Brand, Gary J. A description of STEMS—the stand and tree evaluation and modeling system. Gen. Tech. Rep. NC-79. St. Paul, MN. U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1982. 18 p.*

COMPARING EASTERN SOUTH DAKOTA'S THIRD SURVEY WITH THE SECOND SURVEY

Data from new forest surveys are often compared with data from earlier ones to determine trends in forest areas and volumes. Changes in procedures and definitions between surveys make it necessary to adjust earlier survey data so they are comparable to data from the new survey.

The published 1965 area of commercial forest land, 222,900 acres, was adjusted due to some definitional changes between surveys. Some land now defined as wooded pasture was defined as commercial forest land in 1965. Also, new site productivity curves for ponderosa pine caused some land previously classified as commercial to be classified as unproductive forest land in the current survey. The adjusted 1965 area, 165,400 acres, can be compared directly with the 1980 area (113,600 acres).

The Timber Resource Analysis System (a USDA Forest Service computer program for updating, backdating, and projecting timber volume, growth, mortality, and removals) recalculated 1965 volumes using 1980 estimates of cubic foot volume per tree and 1980 board foot-cubic foot ratios. This volume adjustment was necessary so that volume differences between surveys represented actual change and not merely change in the volume equations used on each occasion.

LOG GRADE

In eastern South Dakota the butt log of every sawtimber tree was graded for quality. Logs were graded on the basis of external characteristics. Hardwood species were graded according to "Hardwood Log Grades for Standard Lumber."[4] The best 12-foot section of the lowest 16-foot hardwood log, or the best 12-foot upper section if the butt log did not meet minimum log-grade standards, was graded as follows:

---

[4] *Vaughn, C.L.; Wollin, C.A.; McDonald, K.A.; Bulgrin, E.H. Hardwood log grades for standard lumber. Res. Pap FPL-63, Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory; 1966. 52 p.*

Forest Service standard grades for hardwood factory saw logs

Grading factors		Specifications							
		Log grade 1				Log grade 2			Log grade 3
Position in tree		Butts only	Butts and uppers			Butts and uppers			Butts and uppers
Scaling diameter, inches		[1]13-15	16-19	20+	[2]11+	12+			8+
Length without trim, feet			10+		10+	8-9	10-11	12+	8+
Required clear cuttings[3] of each of three best faces[4]	Min. length, feet	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	No Limit
	Min. proportion of log length required in clear cutting	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep and crook allowance	For logs with less than one-fourth of end in sound defects	15 percent				30 percent			50 percent
	For logs with more than one-fourth of end in sound defects	10 percent				20 percent			35 percent
Maximum scaling deduction		40 percent[5]				50 percent[6]			50 percent

[1]Ash and basswood butts can be 12 inches if they otherwise meet requirements for small #1's.
[2]Ten-inch logs of all species can be #2's if they otherwise meet requirements for small #1's.
[3]A clear cutting is a portion of a face, extending the width of the face, that is free of defects.
[4]A face is one-fourth of the surface of the log as divided lengthwise.
[5]Otherwise #1 logs with 41-60 percent deductions can be #2.
[6]Otherwise #2 logs with 51-60 percent deductions can be #3.

Forest Service standard specifications for hardwood construction logs (tie and timber logs)

Position in tree		Butt and upper
Min. diameter, small end		8 inches +
Min. length, without trim		8 feet
Clear cuttings		No requirements.
Sweep allowance, absolute		One-fourth of the diameter at the small end for each 8 feet of length.
Sound surface defects	Single knots	Any number, if no one knot has an average diameter above the callus in excess of one-third of the log diameter at point of occurrence.
	Whorled knots	Any number if sum of knot diameters above the callus does not exceed one-third of the log diameter at point of occurrence.
	Holes	Any number provided none has a diameter over one-third of the log diameter at point of occurrence, and none extends more than 3 inches into included timber.[2]
Unsound surface defects		Same requirements as for sound defects if they extend into included timber.[2] No limit if they do not.
End defects	Sound	No requirements.
	Unsound	None allowed; log must be sound internally, but will admit one shake not to exceed one-fourth the scaling diameter and will admit a longitudinal split not extending more than 5 inches into the contained timber.

[1]These specifications are minimum for the class. If, from a group of logs, factory logs are selected first, thus leaving only non-factory logs from which to select construction logs, then the quality range of the construction logs so selected is limited, and the class may be considered a grade. If selection of construction logs is given first priority, then it may be necessary to subdivide the class into grades.

[2]Included timber is always square, and dimension is judged from small end.

Softwood species were graded according to the following specifications:

LOG GRADES FOR SOFTWOOD LOGS

Grade 1

1. Logs must be 16 inches or larger, 10 feet or longer, and with deduction for defect not over 30 percent of gross scale.
2. Logs must be at least 75 percent clear on each of three faces.
3. All knots outside clear cutting must be sound and not over 2-½ inches in diameter.

Grade 2

1. Logs must be 12 inches or larger, 10 feet or longer, and with a net scale after deduction for defect of at least 50 percent of the gross contents of the log.
2. Logs must be at least 50 percent clear on each of three faces or 75 percent clear on two faces.

Grade 3

Logs must be 6 inches or larger, 8 feet or longer, and with a net scale after deduction for defect of at least 50 percent of the gross contents of the log.

Note: (A) Diameters are diameter inside bark at small end of log.
(B) Percent clear refers to percent clear in one continuous section.

PRINCIPAL TREE SPECIES GROUPS IN EASTERN SOUTH DAKOTA[5]

SOFTWOODS
- Ponderosa pine ..... *Pinus ponderosa*
- Juniper
  - Rocky Mountain juniper ..... *Juniperus scopulorum*
  - Eastern redcedar ..... *Juniperus virginiana*

HARDWOODS
- Oak
  - Bur oak ..... *Quercus macrocarpa*
- Basswood
  - American basswood ..... *Tilia americana*
- Soft maple
  - Silver maple ..... *Acer saccharinum*
- Elm
  - American elm ..... *Ulmus americana*
  - Siberian elm ..... *Ulmus pumila*
  - Slippery elm ..... *Ulmus rubra*
  - Rock elm ..... *Ulmus thomasii*
- Ash
  - Green ash ..... *Fraxinus pennsylvanica*
- Cottonwood
  - Eastern cottonwood ..... *Populus deltoides*
  - Plains cottonwood ..... *Populus deltoides* var. *occidentalis*
- Willow
  - Black willow ..... *Salix nigra*
- Hackberry ..... *Celtis occidentalis*
- Other hardwoods
  - Black walnut ..... *Juglans nigra*
  - Boxelder ..... *Acer negundo*
  - Honey locust ..... *Gleditsia triacanthos*
  - Red mulburry ..... *Morus rubra*

[5]*The common and scientific names are based on: Little, Elbert L., Jr. Checklist of United States Trees (Native and Naturalized. Agric. Handb. 541. Washington, D.C.: U.S. Department of Agriculture; 1979. 375 p.*

METRIC EQUIVALENTS OF UNITS USED IN THIS REPORT

1 acre = 4,046.86 square meters or 0.405 hectare.
1,000 acres = 405 hectares.
1 cubic foot = 0.0283 cubic meter.
1 foot = 30.48 centimeters or 0.3048 meter.
1 inch = 25.4 millimeters, 2.54 centimeters, or 0.0254 meter.

DEFINITION OF TERMS

Acceptable trees.—Growing-stock trees of commercial species that meet specified standards of size and quality but do not qualify as desirable trees.

Area-condition classes.—*Class 10.*—Areas fully stocked with desirable trees but not overstocked.

Class 20.—Areas fully stocked with desirable trees but overstocked with all live trees.

Class 30.—Areas medium to fully stocked with desirable trees and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

Class 40.—Areas medium to fully stocked with desirable trees and with 30 percent or more of the area controlled by other trees and/or conditions that ordinarily prevent occupancy by desirable trees.

Class 50.—Areas poorly stocked with desirable trees but fully stocked with growing-stock trees.

Class 60.—Areas poorly stocked with desirable trees but with medium to full stocking of growing-stock trees.

Class 70.—Areas poorly stocked with desirable trees and poorly stocked with growing-stock trees.

Basal area.—The area in square feet of the cross section at breast height of a single tree. When the basal area of all trees in a stand are summed, the result is usually expressed as square feet of basal area per acre.

Biomass.—The above-ground mass of all live trees (including bark and foliage). Biomass is made up of 5 components:

Growing-stock bole.—Biomass of a growing-stock tree from a 1-foot stump to a variable 4-inch top.

Growing-stock tops and limbs.—Biomass of a growing-stock tree from a 1-foot stump minus the growing-stock bole.

Cull bole.—Biomass of a cull tree from a 1-foot stump to a variable 4-inch top.

Cull tops and limbs.—Biomass of a cull tree from a 1-inch stump minus the cull bole.

1- to 5-inch trees.—Biomass of all live trees 1- to 5-inches in diameter at breast height.

Commercial forest land.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commercial forest land have the capability of producing in excess of 20 cubic feet per acre per year of annual growth under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.) Also see definition of pastured commercial forest land.

Commercial species.—Tree species presently or prospectively suitable for industrial wood products. (Note: Excludes species of typically small size, poor form, or inferior quality such as hophornbeam and hawthorn.)

County and municipal land.—Land owned by counties and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

Cropland.—Land under cultivation within the past 24 months, including cropland harvested, crop failures, cultivated summer fallow, idle cropland used only for pasture, orchards, and land in soil improvement crops, but excluding land cultivated in developing improved pasture.

Cull.—Portions of a tree that are unusable for industrial wood products, because of rot, poor form, or other defect.

Desirable trees.—Growing-stock trees having no serious defects in quality limiting present or prospective use, and of relatively high vigor, and containing no pathogens that may kill or seriously deteriorate before rotation age. These trees would be favored by forest managers in silvicultural operations.

Diameter classes.—A classification of trees based on diameter outside bark, measured at breast height (4-½ feet above the ground). (Note: D.b.h. is the common abbreviation for diameter at breast height. Two-inch diameter classes are commonly used in Forest Survey, with the even inch the approximate midpoint for a class. For example, the 6-inch class includes trees 5.0 through 6.9 inches d.b.h. inclusive.)

Farm.—Any land from which $1,000 or more of agricultural products were produced and sold during the year.

Farmer-owned land.—Land owned by operators of farms. (Note: Excludes land leased by farm operators from nonfarm owners, such as railroad companies and States.)

Forest land.—Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. (Note: Stocking is measured by comparison of basal area and/or number of trees, by age or size and spacing with specified standards). The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width at least 120 feet wide to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas shall be classed as forest if less than 120 feet wide. Also see definitions of land area, commercial forest land, noncommercial forest land, productive-reserved forest land, stocking, unproductive forest land, nonforest land, and water.

Forest industry land.—Land owned by companies or individuals operating primary wood-using plants.

Forest trees.—Woody plants having a well developed stem and usually more than 12 feet in height at maturity.

Forest types.—A classification of forest land based upon the species forming a plurality of live tree stocking. Major forest types in Eastern South Dakota are:

Ponderosa pine.—Forests in which ponderosa pine comprises a plurality of the stocking.

Oak.—Forests in which bur oak comprises a plurality of the stocking. (Common associates include ash, basswood and elm.)

Plains hardwoods.—Forests in which black walnut, hackberry, and bur oak, singly or in combination, comprise a plurality of the stocking. Commonly found on slopes and uplands. Juniper is a common associate.

Elm-ash.—Forests in which elm, ash, cottonwood, and willow, singly or in combination, comprise a plurality of the stocking, except for those in which

cottonwood comprises a majority of the stocking. Found on first or second bottoms of major streams.

Cottonwood.—Forests in which cottonwood comprises a majority of the stocking.

Gross area.—The entire area of land and water as determined by the Bureau of the Census, 1980.

Growing-stock trees.—Live trees of commercial species qualifying as desirable and acceptable trees. (Note: Excludes rough and rotten trees.)

Growing-stock volume.—Net volume in cubic feet of growing-stock trees 5.0 inches d.b.h. and over, from a 1-foot stump to a minimum 4.0 inch top diameter outside bark of the central stem, or to the point where the central stem breaks into limbs. Cubic feet can be converted to cords by dividing by 79 cubic feet per solid wood cord.

Hardwoods.—Dicotyledonous trees, usually broad-leaved and deciduous.

Idle farmland.—Includes former cropland, orchards, improved pastures, and farm sites not tended within the past 2 years and presently less than 16.7 percent stocked with trees.

Improved pasture.—Land currently improved for grazing by domestic livestock by cultivation, seeding, irrigation, or clearing of trees or brush, and less than 16.7 percent stocked with live trees. This includes areas classified as range by the USDA Soil Conservation Service.

Indian land.—Tribal land held in fee but administered by the Federal Government.

Land area.—A. *Bureau of the Census.*—The area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than ⅛ of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area.

B. *Forest Inventory and Analysis.*—The same as the Bureau of the Census, except minimum width of streams, etc. is 120 feet and minimum size of lakes, etc. is 1 acre.

Live trees.—Growing-stock, rough, and rotten trees 1 inch d.b.h. and larger.

Log grades.—A classification of logs based on external characteristics as indicators of quality or value. (See Appendix for specific grading factors used.)

Logging residues.—The unused growing-stock portions of trees cut or killed by logging.

Maintained road.—Any road, that is plowed or graded at least once a year. Includes rights of way that are cut or treated to limit herbaceous growth.

Marsh.—Nonforest land that characteristically supports low, generally herbaceous or shrubby vegetation intermittently covered with water.

Merchantable.—Refers to a pulpwood or saw log section that meets pulpwood or saw log specifications, respectively.

Miscellaneous federal land.—Federal land other than National Forest, land administered by the Bureau of Land Management, and Indian land.

Miscellaneous private lands.—Privately owned land other than that owned by forest-industry or farmers.

Mortality.—The annual volume of sound wood in growing-stock and sawtimber trees that die.

National forest land.—Federal land that has been legally designated as National Forests or purchase units, and other land under the administration of the USDA Forest Service.

Net annual growth of growing-stock.—The annual change in volume of sound wood in livesawtimber and poletimber trees and the total volume of trees entering these classes through ingrowth, less volume losses resulting from natural causes.

Net annual growth of sawtimber.—The annual change in the volume of live sawtimber trees and the total volume of trees reaching sawtimber size, less volume losses resulting from natural causes.

Net volume.—Gross volume less deductions for rot, sweep, or other defect affecting use for timber products.

Noncommercial forest land.—Unproductive forest land and productive-reserved forest land. See definitions of unproductive and productive-reserved forest land.

Noncommercial species.—Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land.—Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide, and more than 1 acre in size, to qualify as nonforest land.)

A. *Nonforest land without trees.*—Nonforest land with no live trees present.

B. *Nonforest land with trees.*—Nonforest land with one or more trees at least 5 inches in d.b.h. per acre.

Nonstocked land.—Commercial forest land less than 16.7 percent stocked with growing-stock trees.

Other removals.—Growing-stock trees removed but not utilized for products, or trees left standing but "removed" from the commercial forest land classification by land use change. Examples are removals from cultural operations such as timber stand improvement work, land clearing, and changes in land use.

Ownership.—Property owned by one owner, regardless of the number of parcels in a specified area.

Ownership size class.—The amount of commercial forest land owned by one owner, regardless of the number or parcels.

Owner tenure.—The length of time a property has been held by the owner.

Pastured commercial forest land.— Commercial forest land presently used for grazing but for which the primary use is wood production.

Physiographic class.—A measure of soil and water conditions that affect tree growth on a site. Physiographic classes used in Forest Inventory and Analysis inventories are:

Xeric sites.—very dry soils where excessive drainage seriously limits both growth and species occurrence.

Xeromesic sites.—Moderately dry soils where excessive drainage limits growth and species occurrence to some extent. Example: dry oak ridge.

Mesic sites.—Deep, well-drained soils. Growth and species occurrence are limited only by climate.

Hydromesic sites.—Moderately wet soils where insufficient drainage or infrequent flooding limits growth and species occurrence to some extent. Example: better drained bottomland hardwood sites.

Hydric sites.—Very wet sites where excess water seriously limits both growth and species occurrence. Example: wet, frequently flooded river bottoms.

Plant byproducts.—Plant residues used for products such as mulch, pulp chips, and fuelwood.

Plant residues.—Wood and bark materials generated at manufacturing plants during production of other products.

Poletimber stands.—(See stand-size class.)

Poletimber trees.—Growing-stock trees of commercial species at least 5.0 inches in d.b.h., but smaller than sawtimber size.

Productive-reserved forest land.—Forest land sufficiently productive to qualify as commercial forest land, but withdrawn from timber utilization through statute, administrative regulation, designation, or exclusive use for Christmas-tree production, as indicated by annual shearing.

Pulpwood.—Roundwood, chips from roundwood, and wood residue used to manufacture pulp and to produce flakeboard products such as particleboard, waferboard, and oriented strand board.

Rotten trees.—Live trees of commercial species that do not contain at least one 12-foot saw log or two saw logs 8 feet or longer, now or prospectively because they do not meet Regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume in a tree is rotten.

Rough trees.—(a) Live trees of commercial species that do not contain at least one merchantable 12-foot saw log or two saw logs 8 feet or longer, now or prospectively because they do not meet Regional specifications for freedom from defect primarily due to roughness or poor form, and (b) all live trees of noncommercial species.

Roundwood products.—Logs, bolts, or other round sections (including chips from roundwood) cut from trees for industrial or consumer uses. (Note: Includes saw logs; veneer logs and bolts; cooperage logs and bolts; pulpwood; fuelwood; piling; poles; posts; hewn ties; mine timbers; and various other round, split, or hewn products.)

Salvable dead trees.—Standing or down dead trees considered merchantable by Regional standards.

Saplings.—Live trees 1.0 inch to 5.0 inches in d.b.h.

Sapling-seedling stands.—(See stand-size class.)

Saw log.—A log meeting minimum standards of diameter, length and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter outside bark (d.o.b.) for softwoods of 7 inches (9 inches for hardwoods) or other combinations of size and defect specified by Regional standards.

Saw log portion.—That part of the bole of sawtimber trees between the stump and the saw log top.

Saw log top.—The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw log top is 7.0 inches d.o.b. for softwoods and 9.0 inches d.o.b. for hardwoods.

Sawtimber stands.—(See stand-size class.)

Sawtimber trees.—Growing-stock trees of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting Regional specifications for freedom from defect. Softwoods must be at least 9.0 inches in d.b.h. Hardwoods must be at least 11.0 inches in d.b.h.

Sawtimber volume.—Net volume of the saw log portion of live sawtimber in board feet, International ¼-inch rule, from stump to a minimum 7.0 inches top d.o.b. for softwoods and a minimum 9.0 inches top d.o.b. for hardwoods.

Seedlings.—Live trees less than 1.0 inch in d.b.h. that are expected to survive. Only softwood seedlings

more than 6 inches tall and hardwood seedlings more than 1 foot tall are counted.

Short-log (rough tree).—Live trees of commercial species that contain at least one merchantable 8- to 11-foot saw log but not a 12-foot saw log, now or prospectively.

Shrub biomass.—The total above-ground volume (including the bark) of selected shrubs and trees less than 1-inch d.b.h.

Site classes.—A classification of forest land in terms of inherent capacity to grow crops of industrial wood based on fully stocked natural stands.

Site index.—An expression of forest site quality based on the height of a free-growing dominant or codominant tree of a representative species in the forest type at age 50.

Softwoods.—Coniferous trees, usually evergreen, having needles or scale like leaves.

Stand.—A growth of trees on a minimum of 1 acre of forest land that is stocked by forest trees of any size.

Stand-age class.—Age of the main stand. Main stand refers to trees of the dominant forest type and stand-size class.

Stand-area class.—The extent of a continuous forested area of the same forest type, stand-size class, and stand-density class.

Stand-size class.—A classification of forest land based on the size class of growing-stock trees on the area; that is, sawtimber, poletimber or seedlings and saplings.

A. *Sawtimber stands.*—Stands at least 16.7 percent stocked with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

B. *Poletimber stands.*—Stands at least 16.7 percent stocked with growing-stock trees of which half or more of this stocking is in poletimber and/or sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

C. *Sapling-seedling stands.*—Stands at least 16.7 percent stocked with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

D. *Nonstocked stands.*—Stands in which stocking of growing-stock trees is less than 16.7 percent.

State land.—Land owned by states, or land leased to these governmental units for 50 years or more.

Stocking.—The degree of occupancy of land by trees, measured by basal area and/or the number of trees in a stand by size or age and spacing, compared to the basal area and/or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

A stocking percent of 100 indicates full utilization of the site and is equivalent to 80 square feet of basal area per acre in trees 5 inches d.b.h. and larger. In a stand of trees less than 5 inches d.b.h., a stocking percent of 100 would indicate that the present number of trees is sufficient to produce 80 square feet of basal area per acre when the trees reach 5 inches d.b.h.

Stands are grouped into the following stocking classes:

Overstocked stands.—Stands in which stocking of trees is 134.0 percent or more.

Fully stocked stands.—Stands in which stocking of trees is from 101.0 to 133.9 percent.

Medium stocked stands.—Stands in which stocking of trees is from 61.0 to 100.9 percent.

Poorly stocked stands.—Stands in which stocking of trees is from 16.7 to 60.9 percent.

Nonstocked areas.—Commercial forest land on which stocking of trees is less than 16.7 percent.

Timber removals from growing stock.—The volume of sound wood in growing-stock trees removed annually for forest products (including roundwood products and logging residues) and for other removals.

Timber removals from sawtimber.—The net board-foot volume of live sawtimber trees removed for forest products annually (including roundwood products and logging residues) and for other removals.

Timber products output.—All timber products cut from roundwood and byproducts of wood manufacturing plants. Roundwood products include logs, bolts, or other round sections cut from growing-stock trees, cull trees, salvable dead trees, trees on nonforest land, noncommercial species, sapling-size trees, and limbwood. Byproducts from primary manufacturing plants include slabs, edgings, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and screenings of pulpmills that are used as pulpwood chips or other products.

Unproductive forest land.—Forest land incapable of producing 20 cubic feet per acre of annual growth or of yielding crops of industrial wood under natural conditions because of adverse site conditions. (Note: Adverse conditions include shallow soils, dry climate, poor drainage, high elevation, steepness, and rockiness.)

Upper stem portion.—That part of the bole of sawtimber trees above the saw log top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs.

Urban and other areas.—Areas within the legal boundaries of cities and towns; suburban areas developed for residential, industrial, or recreational

purposes; schoolyards; cemeteries; roads; railroads; airports; beaches; powerlines and other rights-of-way; or other nonforest land not included in any other specified land-use class.

Water.—(a)*Bureau of the Census*.—Streams, sloughs, estuaries, and canals more than ⅛ of a statute mile in width; and lakes, reservoirs, and ponds more than 40 acres in area.

(b)*Noncensus*.—The same as the Bureau of the Census, except minimum width of streams, etc. is 120 feet and minimum size of lakes, etc. is 1 acre.

Windbreak.—A group of trees less than 120 feet wide used for protecting soil, cropfields, and buildings in use.

Wooded pasture.—Improved pasture with more than 16.7 percent stocking in live trees, but less than 25 percent stocking in growing-stock trees. Area is currently improved for grazing or there is other evidence of grazing. (Nonforest land with trees).

Wooded strips.—An acre or more of natural continuous forest land that would otherwise meet survey standards for commercial forest land except that it is less than 120 feet wide. (Nonforest land with trees).

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Table 69.—Sampling errors for estimates other than State totals of volume, net growth, and removals and of area of commercial forest land

Table 1.--Area of land by land class, Eastern South Dakota, 1965 and 1980[1/]

(In thousand acres)

Land class	1965	1980
Forest land:		
Commercial forest land		
Ponderosa pine	24.1	17.8
Oak	7.4	4.5
Elm-ash	62.1	45.4
Cottonwood	42.0	18.5
Plains hardwoods	22.0	13.0
Nonstocked	7.8	14.4
Subtotal	165.4	113.6
Noncommercial forest land		
Unproductive	125.2	147.4
Productive-reserved	--	5.3
Subtotal	125.2	152.7
Total	290.6	266.3
Nonforest land	41,712.5	41,441.9
Total land	42,003.1[2/]	41,708.2[3/]
Census water	405.5[2/]	727.0[3/]
Gross area	42,407.6[2/]	42,435.2[3/]

[1/] Tables may not add to total due to rounding.

[2/] 1960 Bureau of the Census.

[3/] 1980 Bureau of the Census.

Table 2.--Area of land and forest land by county, Eastern South Dakota, 1980[1/]

County	Land area[2/]	Forest land				Nonforest land with trees			
		All forest	Non-commercial	Commercial	Percent commercial forest	All nonforest with trees	Wooded strips and windbreaks	Other nonforest with trees	Percent nonforest with trees
	Thousand acres				Percent	Thousand acres			Percent
Aurora	452.3	0.8	0.5	0.3	0.1	9.6	4.9	4.7	2.1
Beadle	805.5	2.5	1.4	1.1	0.1	6.8	4.7	2.1	0.8
Bennet	756.3	5.9	3.7	2.2	0.3	19.4	6.4	13.0	2.6
Bon Homme	353.3	6.4	2.9	3.5	1.0	10.3	5.4	4.9	2.9
Brookings	509.0	2.6	1.2	1.4	0.3	6.8	3.9	2.9	1.3
Brown	1,102.1	4.9	2.3	2.6	0.2	15.0	8.6	6.4	1.4
Brule	521.4	1.4	0.8	0.6	0.1	13.5	6.3	7.2	2.6
Buffalo	304.3	1.1	0.6	0.5	0.2	3.6	1.8	1.8	1.2
Campbell	468.2	0.4	0.2	0.2	--	3.9	3.8	0.1	0.8
Charles Mix	697.5	7.4	3.5	3.9	0.6	22.5	11.5	11.0	3.2
Clark	609.7	0.9	0.5	0.4	0.1	4.6	2.5	2.1	0.8
Clay	261.5	1.2	0.5	0.7	0.3	3.0	1.7	1.3	1.1
Codington	444.5	1.9	0.8	1.1	0.2	1.4	0.9	0.5	0.3
Corson[3/]	1,578.7	7.9	3.4	4.5	0.3	16.8	8.9	7.9	1.1
Custer[3/]	113.3	0.9	0.4	0.5	0.4	1.3	0.8	0.5	1.1
Davison	278.9	1.1	0.5	0.6	0.2	4.3	2.5	1.8	1.5
Day	654.0	2.8	1.2	1.6	0.2	1.7	1.0	0.7	0.3
Deuel	403.8	1.1	0.5	0.6	0.1	1.6	1.0	0.6	0.4
Dewey	1,478.2	3.9	1.9	2.0	0.1	10.6	5.5	5.1	0.7
Douglas	277.6	0.1	0.1	--	--	1.8	0.9	0.9	0.6
Edmunds	735.6	--	--	--	--	--	--	--	--
Faulk	642.3	--	--	--	--	--	--	--	--
Grant	436.1	3.8	1.6	2.2	0.5	14.2	7.4	6.8	3.3
Gregory	648.6	20.5	13.5	7.0	1.1	40.8	20.9	19.9	6.3
Haakon	1,166.4	4.3	2.2	2.1	0.2	21.6	8.1	13.5	1.9
Hamlin	327.9	1.3	0.6	0.7	0.2	3.3	1.9	1.4	1.0
Hand	919.4	0.3	0.2	0.1	--	7.1	3.7	3.4	0.8
Hanson	277.4	0.6	0.3	0.3	0.1	2.5	1.3	1.2	0.9
Hughes	484.2	1.2	0.6	0.6	0.1	6.8	3.7	3.1	1.4
Hutchinson	522.1	1.4	0.7	0.7	0.1	8.6	4.6	4.0	1.6
Hyde	550.5	--	--	--	--	--	--	--	--
Jackson	519.2	1.2	0.7	0.5	0.1	4.0	1.9	2.1	0.8
Jerauld	339.3	0.6	0.3	0.3	0.1	2.2	1.2	1.0	0.6
Jones	621.5	2.1	1.2	0.9	0.1	9.1	4.4	4.7	1.5
Kingsbury	527.2	1.5	0.8	0.7	0.1	8.6	4.6	4.0	1.6
Lake	358.3	1.1	0.6	0.5	0.1	6.4	2.8	3.6	1.8
Lincoln	369.8	2.6	1.2	1.4	0.4	5.7	3.0	2.7	1.5
Lyman	1,074.5	3.8	1.9	1.9	0.2	10.6	5.1	5.5	1.0
Marshall	542.6	4.3	1.9	2.4	0.4	20.6	10.8	9.8	3.8
McCook	368.4	1.8	0.9	0.9	0.2	7.0	3.6	3.4	1.9
McPherson	734.8	0.1	0.1	--	--	3.4	1.8	1.6	0.5

(Table 2 continued on next page)

(Table 2 continued)

County	Land area[2]	Forest land				Nonforest land with trees			
		All forest	Non-commercial	Commercial	Percent commercial forest	All nonforest with trees	Wooded strips and windbreaks	Other nonforest with trees	Percent nonforest with trees
	Thousand acres				Percent	Thousand acres			Percent
Meade[3]	1,668.0	16.7	12.8	3.9	0.2	15.8	6.6	9.2	0.9
Mellette	838.9	10.4	5.7	4.7	0.6	24.3	11.6	12.7	2.9
Miner	364.7	--	--	--	--	--	--	--	--
Minnehaha	518.1	1.6	0.6	1.0	0.2	1.4	0.9	0.5	0.3
Moody	333.0	2.2	1.0	1.2	0.4	3.4	1.8	1.6	1.0
Pennington[3]	1,104.4	4.1	3.2	0.9	0.1	13.0	6.6	6.4	1.2
Perkins	1,846.0	2.9	1.6	1.3	0.1	18.1	9.4	8.7	1.0
Potter	556.1	0.1	--	0.1	--	--	--	--	--
Roberts	705.5	10.2	4.7	5.5	0.8	8.3	4.7	3.6	1.2
Sanborn	364.0	0.8	0.4	0.4	0.1	4.2	2.2	2.0	1.2
Shannon	1,340.0	59.6	39.5	20.1	1.5	47.7	12.7	35.0	3.6
Spink	963.4	2.1	0.9	1.2	0.1	10.3	6.2	4.1	1.1
Stanley	916.1	1.4	0.6	0.8	0.1	5.5	1.9	3.6	0.6
Sully	621.9	--	--	--	--	0.1	--	0.1	--
Todd	888.3	22.5	13.9	8.6	1.0	28.4	8.7	19.7	3.2
Tripp	1,035.6	3.9	2.0	1.9	0.2	11.5	5.3	6.2	1.1
Turner	394.8	1.6	0.7	0.9	0.2	3.8	1.7	2.1	1.0
Union	290.1	4.5	2.2	2.3	0.8	13.8	6.8	7.0	4.8
Walworth	452.3	--	--	--	--	--	--	--	--
Washabaugh	679.0	5.5	3.0	2.5	0.4	19.5	9.9	9.6	2.9
Yankton	331.4	6.0	2.5	3.5	1.1	13.1	7.5	5.6	4.0
Ziebach	1,260.4	2.5	1.2	1.3	0.1	17.9	9.5	8.4	1.4
All counties	41,708.2	266.3	152.7	113.6	0.3	601.1	287.8	313.3	1.4

[1] Tables may not add to total due to rounding.

[2] 1980 Bureau of Census estimates. Includes: forest, nonforest with trees, and nonforest without trees.

[3] Only the portions of these counties east of the 103rd meridian are included in the area surveyed by the North Central Forest Experiment Station.

Table 3.--Area of commercial forest land by ownership class and forest type, Eastern South Dakota, 1980[1/]

(In thousand acres)

Ownership class	All types	Forest type					
		Ponderosa pine	Oak	Elm-ash	Cottonwood	Plains hardwoods	Nonstocked
Federal	1.3	--	--	1.3	--	--	--
Indian	39.0	17.8	1.3	15.4	1.3	--	3.0
State	3.5	--	--	--	--	1.7	1.8
County and municipal	3.3	--	--	--	1.7	1.7	--
Farmer	64.9	--	3.2	27.0	15.5	9.6	9.5
Miscellaneous private	1.7	--	--	1.7	--	--	--
All owners	113.6	17.8	4.5	45.5	18.5	13.0	14.4

[1/]Tables may not add to total due to rounding.

Table 4.--Area of commercial forest land by ownership class and site class, Eastern South Dakota, 1980[1/]

(In thousand acres)

Ownership class	All classes	Site class (cubic feet of growth/acre/year)					
		225+	165-225	120-165	85-120	50-85	20-50
Federal	1.3	--	--	--	--	--	1.3
Indian	39.0	--	--	--	--	4.6	34.4
State	3.5	--	--	--	--	--	3.5
County and municipal	3.3	--	--	--	--	--	3.3
Farmer	64.9	--	--	--	1.3	12.6	50.9
Miscellaneous private	1.7	--	--	--	--	--	1.7
All owners	113.6	--	--	--	1.3	17.2	95.1

[1/]Tables may not add to total due to rounding.

Table 5.--Area of commercial forest land by ownership class and ownership size class, Eastern South Dakota, 1980[1/]

(In thousand acres)

Ownership class	All classes	Ownership size class (acres)			
		100-500	500-2,500	2,500-5,000	5,000+
Federal	1.3	--	--	--	1.3
Indian	39.0	--	--	--	39.0
State	3.5	--	--	--	3.5
County and municipal	3.3	--	--	--	3.3
Farmer	64.9	5.6	1.7	--	--
Miscellaneous private	1.7	--	1.7	--	--
All owners	113.6	5.6	3.3	--	47.1

[1/]Tables may not add to total due to rounding.

Table 6.--Area of commercial forest land by ownership class and stand-size class, Eastern South Dakota, 1980[1/]

(In thousand acres)

Ownership class	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Federal	1.3	--	--	1.3	--
Indian	39.0	16.6	11.1	8.3	3.0
State	3.5	1.7	--	--	1.8
County and municipal	3.3	1.7	--	1.7	--
Farmer	64.9	27.9	13.4	14.1	9.5
Miscellaneous private	1.7	--	1.7	--	--
All owners	113.6	47.7	26.2	25.4	14.4

[1/] Tables may not add to total due to rounding.

Table 7.--Area of commercial forest land by ownership class and area-condition class, Eastern South Dakota, 1980[1/]

(In thousand acres)

Ownership class	All classes	Area-condition class			
		70	60	50	40 or better
Federal	1.3	--	--	1.3	--
Indian	39.0	28.2	6.4	4.5	--
State	3.5	3.5	--	--	--
County and municipal	3.3	1.7	--	1.7	--
Farmer	64.9	44.9	17.2	2.8	--
Miscellaneous private	1.7	1.7	--	--	--
All owners	113.6	79.8	23.5	10.3	--

[1/] Tables may not add to total due to rounding.

Table 8.--Area of commercial forest land by ownership class and stand-volume class, Eastern South Dakota, 1980[1/]

(In thousand acres)

Ownership class	All classes	Stand-volume class (board feet[2/] per acre)		
		Less than 1,500	1,500-5,000	5,000+
Federal	1.3	1.3	--	--
Indian	39.0	23.5	13.9	1.6
State	3.5	3.5	--	--
County and municipal	3.3	1.7	--	1.7
Farmer	64.9	46.5	13.9	4.5
Miscellaneous private	1.7	1.7	--	--
All owners	113.6	78.2	27.7	7.8

[1/] Tables may not add to rounding.

[2/] International 1/4-inch rule.

Table 9.--Area of commercial forest land by county and forest type, Eastern South Dakota, 1980[1/]

(In thousand acres)

County	All types	Forest type					
		Ponderosa pine	Oak	Elm-ash	Cottonwood	Plains hardwoods	Nonstocked
Aurora	0.3	--	--	0.1	0.1	--	0.1
Beadle	1.1	--	--	0.5	0.2	0.1	0.2
Bennet	2.2	1.6	--	0.4	0.1	0.1	0.1
Bon Homme	3.5	--	0.2	1.7	0.7	0.5	0.4
Brookings	1.4	--	0.1	0.5	0.4	0.2	0.3
Brown	2.6	--	0.1	0.8	0.7	0.4	0.6
Brule	0.6	--	--	0.2	0.2	0.1	0.2
Buffalo	0.5	--	--	0.2	0.2	0.1	0.1
Campbell	0.2	--	--	0.1	0.1	--	--
Charles Mix	3.9	--	0.2	1.8	0.8	0.6	0.5
Clark	0.4	--	--	0.1	0.2	0.1	0.1
Clay	0.7	--	--	0.3	0.2	0.1	0.1
Codington	1.1	--	--	0.6	0.1	0.3	0.1
Corson[2/]	4.5	--	0.2	2.4	0.8	0.8	0.4
Custer[2/]	0.5	--	--	0.2	0.1	0.1	0.1
Davison	0.6	--	0.1	0.2	0.1	0.1	0.1
Day	1.6	--	0.1	1.0	0.2	0.3	0.1
Deuel	0.6	--	--	0.2	0.2	0.1	0.1
Dewey	2.0	--	0.1	1.0	0.3	0.5	0.2
Douglas	--	--	--	--	--	--	--
Edmunds	--	--	--	--	--	--	--
Faulk	--	--	--	--	--	--	--
Grant	2.2	--	0.1	1.5	0.3	0.2	0.1
Gregory	7.0	--	0.5	2.8	1.4	1.0	1.4
Haakon	2.1	--	0.1	0.4	0.5	0.2	1.0
Hamlin	0.7	--	--	0.3	0.2	0.1	0.1
Hand	0.1	--	--	--	0.1	--	--
Hanson	0.3	--	--	0.1	--	0.1	0.1
Hughes	0.6	--	--	0.2	0.2	0.1	0.1
Hutchinson	0.7	--	0.1	0.3	0.1	0.1	0.1

(Table 9 continued on next page)

(Table 9 continued)

County	All types	Forest type					
		Ponderosa pine	Oak	Elm-ash	Cottonwood	Plains hardwoods	Nonstocked
Hyde	--	--	--	--	--	--	--
Jackson	0.5	--	--	0.1	0.2	0.1	0.1
Jerauld	0.3	--	--	0.2	0.1	--	--
Jones	0.9	--	--	0.2	0.3	0.1	0.2
Kingsbury	0.7	--	--	0.2	0.2	0.1	0.2
Lake	0.5	--	--	0.1	0.1	0.1	0.2
Lincoln	1.4	--	0.1	0.5	0.3	0.2	0.3
Lyman	1.9	--	0.1	0.6	0.6	0.3	0.4
Marshall	2.4	--	0.1	1.7	0.3	0.2	0.1
McCook	0.9	--	0.1	0.3	0.2	0.1	0.2
McPherson	--	--	--	--	--	--	--
Meade[2/]	3.9	0.1	0.2	2.1	0.5	0.7	0.4
Mellette	4.7	0.2	0.2	1.7	1.1	0.5	1.0
Miner	--	--	--	--	--	--	--
Minnehaha	1.0	--	0.1	0.5	0.2	0.1	0.1
Moody	1.2	--	--	0.9	0.1	0.1	0.1
Pennington[2/]	0.9	--	--	0.5	0.2	0.1	0.1
Perkins	1.3	--	--	0.3	0.4	0.2	0.3
Potter	0.1	--	--	0.1	--	--	--
Roberts	5.5	--	0.3	3.5	0.7	0.6	0.4
Sanborn	0.4	--	--	0.2	0.1	0.1	0.1
Shannon	20.1	11.8	0.4	5.1	1.3	0.8	0.7
Spink	1.2	--	--	0.6	0.3	0.2	0.1
Stanley	0.8	--	--	0.3	0.2	0.1	0.1
Sully	--	--	--	--	--	--	--
Todd	8.6	3.9	0.2	2.4	0.7	0.5	0.9
Tripp	1.9	--	0.1	0.9	0.4	0.3	0.3
Turner	0.9	--	0.1	0.3	0.1	0.1	0.3
Union	2.3	--	0.1	1.0	0.5	0.3	0.5
Walworth	--	--	--	--	--	--	--
Washabaugh	2.5	0.4	0.1	1.5	0.2	0.1	0.2
Yankton	3.5	--	0.3	1.5	0.5	0.5	0.6
Ziebach	1.3	--	0.1	0.8	0.2	0.1	0.1
All counties	113.6	17.8	4.5	45.5	18.5	13.0	14.4

[1/] Tables may not add to total due to rounding.

[2/] Only the portions of these counties east of the 103rd meridian are included in the area surveyed by the North Central Forest Experiment Station.

Table 10.--Area of commercial forest land by forest type and stand-age class, Eastern South Dakota, 1980[1/]

(In thousand acres)

Forest type	All classes	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	140+
Ponderosa pine	17.8	--	--	--	2.2	--	3.1	6.3	3.1	1.6	1.6	--	--	--
Oak	4.5	1.3	--	--	--	--	--	--	1.7	--	--	1.6	--	--
Elm-ash	45.5	12.8	4.3	3.2	3.2	3.3	5.5	1.7	5.5	1.5	--	2.9	1.6	--
Cottonwood	18.5	--	--	--	--	4.4	--	1.7	3.1	1.7	3.0	3.0	1.7	--
Plains hardwoods	13.0	5.3	1.7	--	2.7	--	--	1.7	--	1.7	--	--	--	--
Nonstocked	14.4	6.5	--	1.7	1.7	1.7	1.6	1.3	--	--	--	--	--	--
All types	113.6	25.9	6.0	4.9	9.7	9.4	10.2	12.6	13.5	6.4	4.6	7.4	3.2	--

[1/] Tables may not add to total due to rounding.

Table 11.--Area of commercial forest land by forest type and stand-size class, Eastern South Dakota, 1980[1/]

(In thousand acres)

Forest type	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Ponderosa pine	17.8	11.0	6.8	--	--
Oak	4.5	3.2	--	1.3	--
Elm-ash	45.5	14.3	14.1	17.1	--
Cottonwood	18.5	15.9	2.6	--	--
Plains hardwoods	13.0	3.3	2.7	7.0	--
Nonstocked	14.4	--	--	--	14.4
All types	113.6	47.7	26.2	25.4	14.4

[1/] Tables may not add to total due to rounding.

Table 12.--Area of commercial forest land by forest type, stand-size class and site class, Eastern South Dakota, 1980[1/]

(In thousand acres)

Forest type and stand-size class	All classes	Site class (cubic feet of growth/acre/year)			
		120+	85-119	50-84	20-49
Ponderosa pine					
Sawtimber	11.0	--	--	1.6	9.4
Poletimber	6.8	--	--	--	6.8
Sapling & seedling	--	--	--	--	--
All stands	17.8	--	--	1.6	16.2
Oak					
Sawtimber	3.2	--	--	1.6	1.7
Poletimber	--	--	--	--	--
Sapling & seedling	1.3	--	--	--	1.3
All stands	4.5	--	--	1.6	3.0
Elm-ash					
Sawtimber	14.3	--	1.3	3.0	9.9
Poletimber	14.1	--	--	1.9	12.2
Sapling & seedling	17.1	--	--	1.7	15.4
All stands	45.5	--	1.3	6.6	37.5
Cottonwood					
Sawtimber	15.9	--	--	3.1	12.7
Poletimber	2.6	--	--	--	2.6
Sapling & seedling	--	--	--	--	--
All stands	18.5	--	--	3.1	15.3
Plains hardwoods					
Sawtimber	3.3	--	--	--	3.3
Poletimber	2.7	--	--	1.3	1.3
Sapling & seedling	7.0	--	--	--	7.0
All stands	13.0	--	--	1.3	11.6
Nonstocked	14.4	--	--	3.0	11.4
All types					
Sawtimber	48.5	--	--	9.3	37.0
Poletimber	26.2	--	1.3	3.2	22.9
Sapling & seedling	25.4	--	--	1.7	23.7
Nonstocked	14.4	--	--	3.0	11.4
All stands	113.6	--	1.3	17.2	95.1

[1/] Tables may not add to total due to rounding.

Table 13.--Area of commercial forest land by forest type, stand-size class, and stocking percent, Eastern South Dakota, 1980[1/]

(In thousand acres)

Forest type and stand-size class	All classes	Stocking percent of growing-stock trees				
		Less than 16.7	16.7-60	61-100	101-133	134+
Ponderosa pine						
Sawtimber	--	--	--	--	--	--
Poletimber	11.0	--	6.3	3.1	1.6	--
Sapling & seedling	6.8	--	3.7	1.6	1.6	--
All stands	17.8	--	10.0	4.7	3.1	--
Oak						
Sawtimber	3.2	--	1.6	1.7	--	--
Poletimber	--	--	--	--	--	--
Sapling & seedling	1.3	--	1.3	--	--	--
All stands	4.5	--	2.9	1.7	--	--
Elm-ash						
Sawtimber	14.3	--	11.4	2.9	--	--
Poletimber	14.1	--	10.5	3.6	--	--
Sapling & seedling	17.1	--	8.3	4.8	4.0	--
All stands	45.5	--	30.2	11.2	4.0	--
Cottonwood						
Sawtimber	15.9	--	9.8	3.0	3.1	--
Poletimber	2.6	--	2.6	--	--	--
Sapling & seedling	--	--	--	--	--	--
All stands	18.5	--	12.3	3.0	3.1	--
Plains hardwoods						
Sawtimber	3.3	--	3.3	--	--	--
Poletimber	2.7	--	1.3	1.3	--	--
Sapling & seedling	7.0	--	5.3	1.7	--	--
All stands	13.0	--	10.0	3.0	--	--
Nonstocked	14.4	14.4	--	--	--	--
All types						
Sawtimber	36.7	--	26.1	7.5	3.1	--
Poletimber	30.3	--	20.7	8.0	1.6	--
Sapling & seedling	32.2	--	18.7	8.0	5.5	--
Nonstocked	99.2	14.4	--	--	--	--
All stands	113.6	14.4	65.4	23.5	10.3	--

[1/] Tables may not add to total due to rounding.

Table 14.--Area of commercial forest land by forest type and site-index class, Eastern South Dakota, 1980[1/]

(In thousand acres)

Forest type	All classes	Site-index class (feet)							
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91+
Ponderosa pine	17.8	--	8.4	7.8	1.6	--	--	--	--
Oak	4.5	--	1.3	1.7	1.6	--	--	--	--
Elm-ash	45.5	--	5.9	22.9	8.8	4.7	1.9	1.3	--
Cottonwood	18.5	--	--	5.0	10.4	--	3.2	--	--
Plains hardwoods	13.0	2.1	1.6	5.0	3.0	1.3	--	--	--
Nonstocked	14.4	--	2.2	6.8	2.4	3.0	--	--	--
All types	113.6	2.1	19.4	49.1	27.7	9.0	5.1	1.3	--

[1/]Tables may not add to total due to rounding.

Table 15.--Area of commercial forest land by forest type and basal-area class, Eastern South Dakota, 1980[1/]

(In thousand acres)

Forest type	All classes	Basal-area class (square feet per acre)									
		0-20	21-40	41-60	61-80	81-100	101-120	121-140	141-160	161-180	181+
Ponderosa pine	17.8	--	5.3	3.1	3.1	3.1	1.6	1.6	--	--	--
Oak	4.5	--	--	1.3	3.2	--	--	--	--	--	--
Elm-ash	45.5	1.3	8.7	17.2	7.4	6.5	2.7	1.7	--	--	--
Cottonwood	18.5	--	3.3	7.7	2.8	3.3	--	1.3	--	--	--
Plains hardwoods	13.0	--	--	8.3	1.7	3.0	--	--	--	--	--
Nonstocked	14.4	4.3	3.9	4.5	1.7	--	--	--	--	--	--
All types	113.6	5.6	21.2	42.2	19.8	16.0	4.3	4.5	--	--	--

[1/]Tables may not add total due to rounding.

Table 16.--Area of commercial forest land by forest type and distance to road, Eastern South Dakota, 1980[1/]

(In thousand acres)

Forest type	Total	Distance to road (miles)							
		0-1/8	1/8-1/4	1/4-1	1-2 1/2	2 1/2-5	5-10	10-20	20+
Ponderosa pine	17.8	3.7	1.6	4.7	3.2	1.6	--	3.1	--
Oak	4.5	--	2.9	1.7	--	--	--	--	--
Elm-ash	45.5	14.1	11.2	17.2	1.7	1.3	--	--	--
Cottonwood	18.5	3.5	6.5	6.9	1.7	--	--	--	--
Plains hardwoods	13.0	6.2	3.0	3.8	--	--	--	--	--
Nonstocked	14.4	10.1	1.3	2.3	0.6	--	--	--	--
All types	113.6	37.6	26.4	36.5	7.1	2.9	--	3.1	--

[1/]A permanent road that is maintained at least once a year. Tables may not add to total due to rounding.

Table 17.--Area of commercial forest land by forest type and distance to water, Eastern South Dakota, 1980[1/]

(In thousand acres)

Forest type	Total	Distance to water (miles)							
		0-1/8	1/8-1/4	1/4-1	1-2 1/2	2 1/2-5	5-10	10-20	20+
Ponderosa pine	17.8	--	--	3.1	6.3	4.7	2.2	--	1.6
Oak	4.5	--	1.7	1.3	--	--	--	1.6	--
Elm-ash	45.5	14.7	--	6.0	8.6	4.3	5.1	1.5	5.3
Cottonwood	18.5	7.2	1.7	1.3	5.0	1.8	--	1.5	--
Plains hardwoods	13.0	3.2	--	3.0	--	5.1	--	--	1.7
Nonstocked	14.4	5.2	--	1.7	4.1	--	1.6	--	1.9
All types	113.6	30.3	3.3	16.4	24.0	15.9	8.8	4.5	10.5

[1/]Lakes or ponds 5 acres or larger in area, and streams or rivers at least 66 feet in width. Tables may not add to total due to rounding.

Table 18.--Area of commercial forest land by forest type and stand-area class, Eastern South Dakota, 1980[1/]

(In thousand acres)

Forest type	All classes	Stand-area class (acres)								
		1-4	5-9	10-19	20-39	40-79	80-159	160-319	320-639	640+
Ponderosa pine	17.8	3.1	7.9	2.2	4.7	--	--	--	--	--
Oak	4.5	1.7	--	1.6	--	--	1.3	--	--	--
Elm-ash	45.5	13.8	11.7	10.4	5.6	1.3	2.7	--	--	--
Cottonwood	18.5	6.6	1.7	3.0	5.6	1.7	--	--	--	--
Plains hardwoods	13.0	4.5	5.4	3.0	--	--	--	--	--	--
Nonstocked	14.4	9.9	1.3	1.6	1.7	--	--	--	--	--
All types	113.6	39.6	27.9	21.6	17.5	3.0	4.0	--	--	--

[1/]Tables may not add to toal due to rounding.

Table 19.--Area of commercial forest land by stocking class based on selected stand components, Eastern South Dakota, 1980[1/]

(In thousand acres)

Stocking percentage	All live trees	Stocking classified in terms of			
		Growing-stock trees	Desirable trees	Acceptable trees	Rough and rotten trees
0-10	1.8	7.5	112.0	8.8	13.6
11-20	--	10.2	1.7	10.2	22.5
21-30	1.7	7.6	--	6.3	32.0
31-40	3.9	14.4	--	14.4	14.0
41-50	8.4	19.8	--	19.8	11.5
51-60	7.1	20.4	--	20.4	11.5
61-70	19.0	6.1	--	6.1	5.7
71-80	9.1	8.1	--	8.1	3.0
81-90	16.4	7.7	--	7.7	--
91-100	11.8	1.7	--	3.3	--
101-110	18.5	7.4	--	5.7	--
111-120	8.9	2.9	--	2.9	--
121-130	1.7	--	--	--	--
131-140	5.3	--	--	--	--
141+	--	--	--	--	--
Total	113.6	113.6	113.6	113.6	113.6

[1/] Tables may not add to total due to rounding.

Table 20.--Area of commercial forest land by forest type, physiographic class, and ownership class, Eastern South Dakota, 1980[1/]

(In thousand acres)

Forest type and physiographic class	All classes	Ownership class					
		Federal	Indian	State	County and municipal	Farmer	Misc. private
Ponderosa pine							
Hydric	--	--	--	--	--	--	--
Hydromesic	1.6	--	1.6	--	--	--	--
Mesic	1.6	--	1.6	--	--	--	--
Xeromesic	14.7	--	14.7	--	--	--	--
Xeric	--	--	--	--	--	--	--
All classes	17.8	--	17.8	--	--	--	--
Oak							
Hydric	--	--	--	--	--	--	--
Hydromesic	3.0	--	1.3	--	--	1.7	--
Mesic	1.6	--	--	--	--	1.6	--
Xeromesic	--	--	--	--	--	--	--
Xeric	--	--	--	--	--	--	--
All classes	4.5	--	1.3	--	--	3.2	--
Elm-ash							
Hydric	--	--	--	--	--	--	--
Hydromesic	10.0	1.3	5.6	--	--	3.1	--
Mesic	31.4	--	7.2	--	--	22.6	1.7
Xeromesic	4.0	--	2.7	--	--	1.3	--
Xeric	--	--	--	--	--	--	--
All classes	45.5	1.3	15.4	--	--	27.0	1.7
Cottonwood							
Hydric	--	--	--	--	--	--	--
Hydromesic	7.2	--	1.3	--	1.7	4.2	--
Mesic	8.0	--	--	--	--	8.0	--
Xeromesic	3.3	--	--	--	--	3.3	--
Xeric	--	--	--	--	--	--	--
All classes	18.5	--	1.3	--	1.7	15.5	--
Plains hardwoods							
Hydric	--	--	--	--	--	--	--
Hydromesic	--	--	--	--	--	--	--
Mesic	13.0	--	--	1.7	1.7	9.6	--
Xeromesic	--	--	--	--	--	--	--
Xeric	--	--	--	--	--	--	--
All classes	13.0	--	--	1.7	1.7	9.6	--
Nonstocked							
Hydric	--	--	--	--	--	--	--
Hydromesic	--	--	--	--	--	--	--
Mesic	13.0	--	1.7	1.8	--	9.5	--
Xeromesic	0.8	--	0.8	--	--	--	--
Xeric	0.6	--	0.6	--	--	--	--
All classes	14.4	--	3.0	1.8	--	9.5	--
All types							
Hydric	--	--	--	--	--	--	--
Hydromesic	21.8	1.3	9.8	--	1.7	9.0	--
Mesic	68.6	--	10.5	3.5	1.7	51.3	1.7
Xeromesic	22.8	--	18.2	--	--	4.6	--
Xeric	0.6	--	0.6	--	--	--	--
All classes	113.6	1.3	39.0	3.5	3.3	64.9	1.7

[1/] Tables may not add to total due to rounding.

Table 21.--Area of noncommercial forest land by ownership class, Eastern South Dakota, 1980[1/]

(In thousand acres)

Ownership class	Total	Unproductive	Productive-reserved
Federal	8.5	3.2	5.3
Indian	64.1	64.1	--
State	2.6	2.6	--
County and municipal	--	--	--
Farmer	77.5	77.5	--
Miscellaneous private	--	--	--
All owners	152.7	147.4	5.3

[1/] Tables may not add to total due to rounding.

Table 22.--Area of noncommercial forest land by forest type, Eastern South Dakota, 1980[1/]

(In thousand acres)

Ownership class	Total	Unproductive	Productive-reserved
Ponderosa pine	46.9	46.6	0.3
Juniper	2.3	--	2.3
Oak	40.0	40.0	--
Elm-ash	53.0	50.3	2.7
Cottonwood	--	--	--
Plains hardwoods	--	--	--
Nonstocked	10.5	10.5	--
All types	152.7	147.4	5.3

[1/] Tables may not total due to rounding.

Table 23.--Area of nonforest land with trees by land use and forest type, Eastern South Dakota, 1980[1/]

(In thousand acres)

Land use	All types	Forest type					
		Ponderosa pine	Oak	Elm-ash	Cottonwood	Plains hardwoods	Nonstocked
Cropland	22.1	--	--	22.1	--	--	--
Improved pasture	265.0	64.5	24.3	166.4	--	--	9.8
Wooded strips	160.0	5.0	26.4	128.6	--	--	--
Idle farmland	10.4	--	--	8.7	--	--	1.7
Marsh	5.4	--	--	5.4	--	--	--
Windbreaks	127.8	--	--	119.0	1.8	3.6	3.3
Wooded pasture	10.5	--	--	7.2	1.7	--	1.7
All uses	601.1	69.6	50.6	457.3	3.5	3.6	16.4

[1/]Tables may not add to total due to rounding.

Table 24.--Area of windbreaks by forest type and stand-size class, Eastern South Dakota, 1980[1/]

(In thousand acres)

Forest type	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Ponderosa pine	--	--	--	--	--
Oak	--	--	--	--	--
Elm-ash	119.0	11.0	88.0	19.9	--
Cottonwood	1.8	1.8	--	--	--
Plains hardwoods	3.6	--	3.6	--	--
Nonstocked	3.3	--	--	--	3.3
All types	127.8	12.9	91.7	19.9	3.3

[1/]Tables may not add to total due to rounding.

Table 25.--Number of all live trees on commercial forest land by species group and diameter class, Eastern South Dakota, 1980[1/]

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS															
Ponderosa pine	3,807	1,112	526	824	738	307	125	73	67	21	10	2	--	1	--
Juniper	2,130	1,438	311	193	119	60	--	8	--	--	--	2	--	--	--
Total	5,937	2,550	837	1,016	857	367	126	81	67	21	10	4	--	1	--
HARDWOODS															
Oak	3,079	754	886	606	363	166	149	92	43	9	10	--	2	--	--
Basswood	328	--	133	24	44	62	41	17	9	--	--	--	--	--	--
Soft maple	42	--	--	--	--	--	--	15	4	9	5	--	2	6	1
Elm	3,217	799	401	906	471	332	125	106	23	28	16	4	8	1	--
Ash	7,490	3,112	1,385	1,232	875	425	240	59	77	44	25	8	8	--	--
Cottonwood	1,031	--	148	256	34	184	104	66	43	19	42	28	62	38	8
Willow	175	--	--	73	14	21	33	11	14	6	--	--	2	--	--
Hackberry	789	166	464	81	79	--	--	--	--	--	--	--	--	--	--
Other hardwoods	2,816	1,382	190	345	382	204	137	49	53	31	16	14	13	2	--
Noncommercial species	530	530	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	19,498	6,742	3,606	3,523	2,260	1,393	830	415	265	146	114	54	95	47	9
All species	25,435	9,293	4,443	4,539	3,117	1,760	955	495	332	167	124	58	95	48	9

[1/] Tables may not add to total due to rounding.

Table 26.--Number of growing-stock trees on commercial forest land by species group and diameter class, Eastern South Dakota, 1980[1/]

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS															
Ponderosa pine	3,226	957	370	692	668	250	119	68	67	21	10	2	--	1	--
Juniper	1,966	1,438	311	138	65	12	--	2	--	--	--	--	--	--	--
Total	5,192	2,395	681	830	733	262	119	70	67	21	10	2	--	1	--
HARDWOODS															
Oak	2,136	754	886	181	128	60	63	28	26	6	3	--	2	--	--
Basswood	81	--	--	--	13	41	27	--	--	--	--	--	--	--	--
Soft maple	13	--	--	--	--	--	--	5	4	--	3	--	--	--	1
Elm	1,705	663	136	456	225	132	28	34	11	7	8	2	5	--	--
Ash	5,556	2,546	1,117	816	486	270	171	38	56	29	16	6	6	--	--
Cottonwood	877	--	148	256	13	129	76	56	34	19	36	23	52	31	3
Willow	32	--	--	--	--	11	6	4	3	6	--	--	2	--	--
Hackberry	723	166	464	38	56	--	--	--	--	--	--	--	--	--	--
Other hardwoods	1,763	1,226	190	87	144	75	8	17	4	3	3	5	1	--	--
Total	12,886	5,355	2,941	1,833	1,066	718	378	181	138	70	69	36	67	31	5
All species	18,078	7,750	3,622	2,664	1,799	980	497	251	205	91	79	38	67	32	5

[1/] Tables may not add to total due to rounding.

Table 27.--Net volume of growing stock and sawtimber on commercial forest land by species group, Eastern South Dakota, 1965 and 1980[1/]

Species group	Growing stock		Sawtimber	
	1965[2/]	1980	1965[2/]	1980
	Thousand cubic feet		Thousand board feet[3/]	
SOFTWOODS				
Ponderosa pine	15,700	11,324	46,450	38,644
Juniper	--	641	--	663
Total	15,700	11,965	46,450	39,308
HARDWOODS				
Oak	3,690	3,023	6,060	9,832
Basswood	2,140	602	1,510	1,482
Soft maple	1,060	622	2,530	3,038
Elm	15,570	3,873	58,040	7,833
Ash	19,420	11,744	40,020	31,936
Cottonwood	27,720	17,230	119,770	77,328
Willow	1,730	698	6,570	2,579
Hackberry	170	281	140	--
Other hardwoods	2,390	1,868	4,780	3,064
Total	73,890	39,941	239,420	137,092
All species	89,590	51,907	285,870	176,400

[1/] Tables may not add to total due to rounding.

[2/] Figures have been adjusted from those published after the 1965 survey to conform to 1980 areas because of changes in survey definitions and procedures.

[3/] International 1/4-inch rule.

Table 28.--Net volume of all live trees on commercial forest land by species group and diameter class, Eastern South Dakota, 1980[1/]

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS													
Ponderosa pine	12,185	1,608	3,088	2,109	1,454	1,162	1,523	653	374	95	--	129	--
Juniper	1,100	323	377	370	--	31	--	--	--	--	--	--	--
Total	13,285	1,931	3,464	2,478	1,454	1,194	1,523	643	374	95	--	129	--
HARDWOODS													
Oak	6,853	1,167	1,281	982	1,302	915	717	213	211	--	67	--	--
Basswood	1,216	44	121	373	396	176	106	--	--	--	--	--	--
Soft maple	1,621	--	--	--	--	269	114	208	284	--	17	534	196
Elm	8,430	1,241	1,422	1,610	988	1,139	377	558	510	163	361	61	--
Ash	15,575	2,053	2,991	2,543	2,482	761	1,715	1,479	720	406	426	--	--
Cottonwood	20,506	596	121	1,328	1,027	1,233	986	658	1,710	1,431	4,428	4,859	2,130
Willow	1,083	68	1	152	234	184	184	172	--	--	88	--	--
Hackberry	414	134	280	--	--	--	--	--	--	--	--	--	--
Other hardwoods	5,585	433	969	1,021	626	421	621	497	275	307	322	94	--
Noncommercial species	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	61,284	5,736	7,186	8,008	7,054	5,097	4,819	3,784	3,710	2,307	5,709	5,548	2,326
All species	74,569	7,667	10,650	10,487	8,508	6,291	6,342	4,428	4,084	2,402	5,709	5,676	2,326

[1/] Tables may not add to total due to rounding.

Table 29.--Net volume of timber on commercial forest land by class of timber and softwoods and hardwoods, Eastern South Dakota, 1980[1/]

(In thousand cubic feet)

Class of timber	All species	Softwoods	Hardwoods
LIVE TREES			
Growing-stock trees			
Sawtimber			
Saw log portion	27,552	6,347	21,204
Upper stem portion	7,239	849	6,390
Subtotal	34,791	7,196	27,595
Poletimber	17,116	4,769	12,347
Total growing stock	51,907	11,965	39,941
Cull trees			
Rough and rotten cull trees			
Sawtimber	9,305	449	8,857
Poletimber	9,154	626	8,528
Subtotal	18,459	1,075	17,384
Short-log trees	4,203	245	3,958
Total cull	22,662	1,319	21,343
TOTAL LIVE TREES	74,569	13,284	61,284
SALVABLE DEAD TREES	2,318	--	2,318
ALL CLASSES	76,887	13,285	63,602

[1/] Tables may not add to total due to rounding.

Table 30.--Net volume of growing-stock, sawtimber, short-log, and rough and rotten trees on commercial forest land by individual species, Eastern South Dakota, 1980[1/]

Species	Total all live	Growing stock	Short-log cull	Rough and rotten cull	Sawtimber
		Thousand cubic feet			Thousand[2/] board feet
Rocky mountain juniper	151	25	--	127	117
Eastern redcedar	949	617	--	332	546
Ponderosa pine	12,185	11,324	245	616	38,644
Boxelder	5,158	1,610	545	3,002	3,064
Silver maple	1,621	622	176	823	3,038
Hackberry	414	281	--	133	--
Green ash	15,575	11,745	558	3,273	31,936
Honeylocust	362	258	104	--	--
Black walnut	24	--	--	24	--
Red mulberry	42	--	--	42	--
Eastern cottonwood	20,197	16,920	709	2,568	75,206
Plains cottonwood	310	310	--	--	2,122
Bur oak	6,853	3,023	799	3,031	9,832
Black willow	1,083	698	87	297	2,579
American basswood	1,216	602	128	486	1,482
American elm	4,782	1,925	556	2,301	5,588
Siberian elm	2,064	1,203	69	792	1,068
Slippery elm	383	--	67	316	--
Rock elm	1,202	745	106	351	1,177
All species	74,569	51,907	4,148	18,514	176,400

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

Table 31.--Net volume of growing stock on commercial forest land by species group and county, Eastern South Dakota, 1980[1/]

(In thousand cubic feet)

County	All species	Softwoods			Hardwoods									
		Ponderosa pine	Juniper	Total softwoods	Oak	Basswood	Soft maple	Elm	Ash	Cottonwood	Willow	Hackberry	Other hardwoods	Total hardwoods
Aurora	115.8	--	2.2	2.2	7.5	1.1	1.1	10.6	16.6	74.6	0.5	1.1	0.5	113.6
Beadle	585.8	--	8.7	8.7	32.2	7.7	4.2	95.2	168.3	220.0	2.0	4.5	43.0	577.1
Bennet	974.2	683.2	0.9	684.1	56.6	3.4	0.4	26.7	68.6	111.0	9.2	1.7	12.5	290.1
Bon Homme	1,441.6	18.2	26.9	45.1	102.9	15.8	18.8	116.9	400.3	629.9	34.6	10.1	67.2	1,396.5
Brookings	636.3	1.1	13.6	14.7	50.6	7.8	6.6	69.9	109.9	359.3	4.9	7.3	5.3	621.6
Brown	1,168.3	--	26.4	26.4	91.8	13.9	12.9	129.7	191.0	677.2	6.1	13.7	5.6	1,141.9
Brule	194.0	1.1	3.0	4.1	13.7	2.2	1.5	17.8	34.5	112.8	2.5	1.8	3.1	189.9
Buffalo	219.3	1.1	3.6	4.7	15.9	2.5	1.7	20.8	38.2	127.4	2.7	2.1	3.3	214.6
Campbell	56.4	1.1	--	1.1	3.2	0.6	--	3.1	11.6	32.4	1.8	0.2	2.4	55.3
Charles Mix	1,610.3	17.6	30.3	47.9	108.8	17.1	27.4	130.3	417.7	738.0	33.7	11.5	77.9	1,562.4
Clark	192.9	--	4.0	4.0	13.9	2.1	2.0	19.7	29.2	118.2	0.9	2.1	0.8	188.9
Clay	280.8	2.2	4.4	6.6	21.9	3.5	2.1	27.8	55.6	150.0	4.6	2.8	5.9	274.2
Codington	382.4	8.1	21.6	29.7	29.2	5.1	0.7	37.5	102.1	143.7	13.4	2.6	18.4	352.7
Corson[2/]	1,847.3	26.5	44.1	70.6	130.0	20.6	26.3	150.3	526.0	764.5	48.5	12.2	98.3	1,776.7
Custer[2/]	230.7	--	5.3	5.3	18.5	2.8	2.6	26.1	38.3	132.0	1.2	2.8	1.1	225.4
Davison	262.9	--	3.8	3.8	21.7	2.0	1.9	20.4	101.7	103.4	3.2	2.0	2.8	259.1
Day	738.2	7.6	15.4	23.0	41.5	11.5	28.3	51.3	250.1	251.0	14.6	3.1	63.8	715.2
Deuel	278.3	--	6.4	6.4	22.3	3.4	3.1	31.5	46.2	159.2	1.5	3.3	1.4	271.9
Dewey	734.9	13.1	33.1	46.2	54.6	9.3	2.1	69.6	180.7	314.5	22.4	5.2	30.3	688.7
Douglas	4.3	--	--	--	--	--	--	--	0.2	4.1	--	--	--	4.3
Edmunds	20.3	--	0.5	0.5	1.6	0.2	0.2	2.3	3.4	11.7	0.1	0.2	0.1	19.8
Faulk	18.6	--	0.4	0.4	1.5	0.2	0.2	2.1	3.1	10.7	0.1	0.2	0.1	18.2
Grant	939.3	20.0	0.4	20.4	62.2	11.0	0.2	108.2	324.8	288.3	32.9	4.9	86.4	918.9
Gregory	3,111.8	3.2	47.6	50.8	218.6	28.2	68.3	248.1	980.6	1,357.2	29.7	23.8	106.5	3,061.0
Haakon	590.4	1.1	12.7	13.8	39.1	5.6	4.6	51.4	107.0	353.9	4.7	5.2	5.1	576.6
Hamlin	306.9	1.1	6.1	7.2	24.5	3.8	3.0	33.0	56.0	169.0	3.2	3.4	3.8	299.7
Hand	55.5	--	0.9	0.9	3.0	0.5	0.4	4.3	7.1	38.5	0.2	0.4	0.2	54.6
Hanson	121.5	--	1.3	1.3	10.0	0.7	0.6	7.3	58.8	38.7	1.8	0.7	1.6	120.2
Hughes	284.3	--	6.2	6.2	21.7	3.3	3.0	30.6	45.6	168.0	1.4	3.2	1.3	278.1
Hutchinson	272.9	--	3.0	3.0	21.8	1.6	1.5	16.9	122.2	97.2	3.8	1.6	3.3	269.9
Hyde	18.8	--	0.4	0.4	1.5	0.2	0.2	2.1	3.1	10.9	0.1	0.2	0.1	18.4
Jackson	211.5	--	4.1	4.1	14.1	2.1	2.0	19.9	29.4	136.0	0.9	2.1	0.9	207.4
Jerauld	126.8	2.2	0.9	3.1	9.6	1.6	0.4	10.4	29.9	62.0	3.8	0.9	5.1	123.7
Jones	377.9	--	6.5	6.5	25.6	3.5	3.2	32.6	72.7	226.1	2.3	3.4	2.0	371.4
Kingsbury	327.8	--	7.2	7.2	24.9	3.8	3.5	35.2	52.3	194.1	1.6	3.7	1.5	320.6
Lake	177.8	--	3.0	3.0	13.1	1.6	1.4	15.1	46.3	93.1	1.4	1.5	1.3	174.8
Lincoln	630.0	--	10.8	10.8	45.9	5.7	12.1	55.4	175.3	298.8	4.8	5.6	15.6	619.2
Lyman	761.9	2.3	12.9	15.2	54.7	8.0	6.3	70.5	143.7	440.3	7.5	7.2	8.5	746.7
Marshall	1,035.3	21.4	1.3	22.7	69.5	12.3	0.6	114.8	343.7	342.2	35.4	5.6	88.5	1,012.6
McCook	364.0	1.1	5.6	6.7	28.6	3.6	2.8	31.9	103.0	174.6	4.6	3.2	5.0	357.3
McPherson	8.9	--	--	--	--	--	--	--	0.4	8.5	--	--	--	8.9

(Table 31 continued on next page)

(Table 31 continued)

County	All species	Softwoods			Hardwoods									
		Ponderosa pine	Juniper	Total softwoods	Oak	Basswood	Soft maple	Elm	Ash	Cottonwood	Willow	Hackberry	Other hardwoods	Total hardwoods
Meade[2/]	1,705.1	33.7	44.9	78.6	168.7	137.8	11.4	249.5	556.6	431.8	24.2	6.9	39.6	1,626.5
Mellette	2,020.2	78.9	33.0	111.9	127.3	26.0	26.9	212.0	501.4	901.6	16.5	15.2	81.4	1,908.3
Miner	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minnehaha	401.1	6.6	3.0	9.6	33.3	5.2	1.5	34.2	118.1	167.8	12.2	3.1	16.1	391.5
Moody	604.3	8.8	0.9	9.7	29.7	5.2	7.2	78.7	227.2	157.3	14.6	2.5	72.2	594.6
Pennington[2/]	368.3	6.5	2.6	9.1	28.7	4.9	1.2	31.2	90.5	173.4	11.3	2.8	15.2	359.2
Perkins	516.8	--	16.4	16.4	34.6	5.2	4.8	51.3	74.8	320.2	2.3	5.1	2.1	500.4
Potter	40.0	1.2	--	1.2	3.5	0.6	--	3.3	12.4	14.2	1.9	0.3	2.6	38.8
Roberts	2,587.4	26.2	22.4	48.6	167.9	78.2	90.9	203.5	930.5	793.8	52.0	9.4	212.6	2,538.8
Sanborn	160.9	2.2	1.7	3.9	12.7	2.1	0.8	14.9	36.8	79.0	4.0	1.4	5.3	157.0
Shannon	11,505.9	7,760.7	22.7	7,783.4	288.7	24.8	115.6	311.2	1,290.7	1,338.3	69.5	14.4	269.3	3,722.5
Spink	543.9	4.4	8.8	13.2	32.9	5.3	16.3	43.1	135.3	251.8	8.5	3.9	33.6	530.7
Stanley	325.9	3.2	4.7	7.9	26.2	4.2	2.3	32.3	68.9	166.2	6.4	3.2	8.3	318.0
Sully	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Todd	3,992.6	2,313.5	39.2	2,352.7	185.7	19.4	8.6	198.1	404.1	728.9	35.4	13.5	46.2	1,639.9
Tripp	761.4	8.8	11.8	20.6	62.4	18.4	4.2	79.9	166.7	364.8	16.4	6.5	21.5	740.8
Turner	321.0	--	5.2	5.2	26.7	2.8	2.6	27.3	113.1	134.0	3.5	2.7	3.1	315.8
Union	1,032.0	2.2	11.9	14.1	61.9	7.5	32.6	70.7	322.8	450.5	10.1	6.7	55.1	1,017.9
Walworth	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Washabaugh	1,213.4	222.8	5.2	228.0	53.5	8.6	0.6	149.1	377.6	251.4	24.1	4.1	116.4	985.4
Yankton	1,556.4	--	17.3	17.3	114.0	9.2	29.0	97.8	669.8	541.3	18.6	9.0	50.4	1,539.1
Ziebach	533.3	11.1	4.1	15.2	36.6	6.4	7.3	37.9	151.9	220.3	18.3	3.0	36.4	518.1
All counties	51,906.8	11,324.1	641.3	11,965.4	3,023.3	601.7	622.0	3,873.3	11,744.4	17,229.6	698.4	280.8	1,867.9	39,941.4

[1/] Tables may not add to total due to rounding.

[2/] Only the portions of these counties east of the 103rd meridian are included in the area surveyed by the North Central Forest Experiment Station.

Table 32.--Net volume of sawtimber on commercial forest land by species group and county, Eastern South Dakota, 1980[1/]

(In thousand board feet)[2/]

County	All species	Softwoods			Hardwoods									
		Ponderosa pine	Juniper	Total softwoods	Oak	Basswood	Soft maple	Elm	Ash	Cottonwood	Willow	Hackberry	Other hardwoods	Total hardwoods
Aurora	380.5	--	--	--	22.1	2.2	3.9	14.3	23.4	313.5	--	--	1.1	380.5
Beadle	1,572.8	--	--	--	94.6	19.5	15.7	170.1	219.8	1,048.5	--	--	4.6	1,572.8
Bennet	3,003.5	2,093.5	--	2,093.5	83.6	6.2	1.6	83.5	147.4	545.5	33.5	--	8.7	910.0
Bon Homme	4,950.2	106.2	39.7	145.9	350.6	29.1	92.3	240.6	1,044.5	2,813.9	127.4	--	105.9	4,804.3
Brookings	2,200.2	6.3	--	6.3	151.8	14.7	24.6	97.5	172.3	1,717.6	6.6	--	8.8	2,193.9
Brown	4,029.3	--	--	--	270.9	26.5	47.8	174.7	286.6	3,208.9	--	--	13.9	4,029.3
Brule	650.1	6.4	--	6.4	43.0	4.1	5.4	27.4	57.4	496.6	6.6	--	3.2	643.7
Buffalo	712.1	6.6	--	6.6	49.5	4.7	6.5	31.5	64.7	538.1	6.9	--	3.6	705.5
Campbell	154.3	6.2	--	6.2	12.1	1.0	--	7.5	24.6	94.8	6.5	--	1.6	148.1
Charles Mix	5,468.7	102.9	40.8	143.7	365.4	31.4	136.6	257.2	1,039.1	3,235.1	118.9	--	141.3	5,325.0
Clark	637.3	--	--	--	41.1	4.0	7.2	26.5	43.4	513.0	--	--	2.1	637.3
Clay	951.5	13.0	--	13.0	69.9	6.5	7.9	44.3	98.2	692.4	13.6	--	5.7	938.5
Codington	1,305.5	47.1	51.2	98.3	105.3	9.2	2.5	115.2	199.3	713.6	49.2	--	12.9	1,207.2
Corson	6,381.7	155.2	82.1	237.3	450.7	37.6	132.6	343.2	1,339.1	3,506.1	179.2	--	155.9	6,144.4
Custer[3/]	800.0	--	--	--	54.6	5.3	9.6	35.2	57.7	634.8	--	--	2.8	800.0
Davison	1,013.2	--	--	--	67.9	3.9	7.0	25.4	396.0	488.8	16.6	--	7.6	1,013.2
Day	2,574.5	44.6	32.3	76.9	142.9	31.4	150.9	123.8	758.3	1,079.4	57.7	--	153.2	2,497.6
Deuel	964.9	--	--	--	65.8	6.4	11.6	42.4	69.6	765.7	--	--	3.4	964.9
Dewey	2,472.2	76.5	72.8	149.3	192.4	17.0	7.8	190.7	346.2	1,466.8	80.0	--	22.0	2,322.9
Douglas	10.9	--	--	--	--	--	--	--	--	10.9	--	--	--	10.9
Edmunds	70.4	--	--	--	4.8	0.5	0.8	3.1	5.1	55.9	--	--	0.2	70.4
Faulk	64.6	--	--	--	4.4	0.4	0.8	2.8	4.7	51.3	--	--	0.2	64.6
Grant	2,824.0	116.8	--	116.8	231.3	19.9	0.8	244.3	588.9	1,469.4	122.2	--	30.4	2,707.2
Gregory	11,346.8	18.9	8.0	26.9	677.0	58.3	333.3	335.3	3,331.7	6,161.0	124.0	--	299.3	11,319.9
Haakon	1,880.1	6.4	8.2	14.6	119.2	10.6	17.2	78.3	247.4	1,372.0	12.3	--	8.5	1,865.5
Hamlin	1,062.1	6.5	--	6.5	75.0	7.2	11.0	48.0	91.3	811.5	6.7	--	4.9	1,055.6
Hand	175.5	--	--	--	8.9	0.9	1.6	5.7	9.4	148.5	--	--	0.5	175.5
Hanson	488.1	--	--	--	32.3	1.3	2.3	8.5	250.8	177.4	11.1	--	4.4	488.1
Hughes	972.7	--	--	--	64.0	6.2	11.3	41.3	67.7	778.9	--	--	3.3	972.7
Hutchinson	1,072.3	--	--	--	69.5	3.0	5.5	20.0	511.1	431.7	22.4	--	9.1	1,072.3
Hyde	65.3	--	--	--	4.5	0.4	0.8	2.9	4.7	51.8	--	--	0.2	65.3
Jackson	659.1	--	--	--	41.6	4.1	7.3	26.8	44.1	533.1	--	--	2.1	659.1
Jerauld	417.8	12.7	--	12.7	33.4	3.0	1.5	20.8	59.1	270.3	13.3	--	3.7	405.1
Jones	1,221.1	--	--	--	76.8	6.5	11.8	43.2	191.6	880.2	5.7	--	5.3	1,221.1
Kingsbury	1,120.1	--	--	--	73.4	7.2	13.0	47.4	77.6	897.7	--	--	3.8	1,120.1
Lake	621.3	--	--	--	39.9	3.0	5.4	19.7	149.7	394.7	5.5	--	3.4	621.3
Lincoln	2,277.5	--	--	--	139.5	10.8	56.4	71.4	555.6	1,381.3	16.8	--	45.7	2,277.5
Lyman	2,490.2	13.2	--	13.2	168.2	15.2	23.4	101.3	315.3	1,821.8	19.6	--	12.2	2,477.0
Marshall	3,159.5	125.3	--	125.3	256.2	22.1	2.3	256.4	626.8	1,706.2	131.1	--	33.1	3,034.2
McCook	1,305.1	6.5	--	6.5	89.7	6.7	10.2	45.0	326.5	794.1	18.0	--	8.4	1,298.6
McPherson	22.5	--	--	--	--	--	--	--	--	22.5	--	--	--	22.5

(Table 32 continued on next page)

(Table 32 continued)

County	All species	Softwoods			Hardwoods									
		Ponderosa pine	Juniper	Total softwoods	Oak	Basswood	Soft maple	Elm	Ash	Cottonwood	Willow	Hackberry	Other hardwoods	Total hardwoods
Meade[3/]	5,643.1	142.4	89.5	231.9	524.2	469.8	54.0	676.7	1,578.4	1,927.3	109.5	--	71.3	5,411.2
Mellette	6,449.4	297.4	26.8	324.2	392.3	63.9	123.1	351.0	1,163.5	3,885.4	49.0	--	97.0	6,125.2
Miner	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minnehaha	1,417.5	38.5	--	38.5	115.4	9.4	5.5	66.0	303.2	820.2	45.9	--	13.4	1,379.0
Moody	1,660.0	51.4	--	51.4	108.7	9.4	38.4	168.0	416.1	766.0	53.8	--	48.2	1,608.6
Pennington[3/]	1,261.2	38.1	--	38.1	100.2	8.9	4.6	62.4	177.1	818.9	39.8	--	11.2	1,223.1
Perkins	1,664.5	--	16.3	16.3	101.9	10.0	18.0	81.7	107.8	1,323.6	--	--	5.2	1,648.2
Potter	141.1	6.7	--	6.7	13.1	1.1	--	8.0	26.4	77.1	7.0	--	1.7	134.4
Roberts	8,995.4	153.0	40.4	193.4	566.9	245.9	487.3	484.2	2,891.9	3,404.4	215.6	--	505.8	8,802.0
Sanborn	554.0	12.9	--	12.9	42.8	3.9	3.1	26.9	69.4	377.2	13.5	--	4.3	541.1
Shannon	38,526.6	24,888.2	24.5	24,912.7	1,019.0	45.2	615.6	995.0	4,463.4	5,543.6	292.2	--	639.9	13,613.9
Spink	1,860.8	25.7	8.1	33.8	107.4	9.9	83.8	75.7	322.2	1,122.7	26.9	--	78.4	1,827.0
Stanley	1,114.5	19.0	--	19.0	84.9	7.9	8.5	53.7	125.2	788.0	19.9	--	7.4	1,095.5
Sully	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Todd	15,104.2	9,196.6	88.1	9,284.7	653.4	35.9	32.0	486.0	989.1	3,464.3	119.5	--	39.3	5,819.5
Tripp	2,539.7	51.3	8.1	59.4	204.4	49.4	15.6	159.4	294.6	1,685.5	53.6	--	17.8	2,480.3
Turner	1,221.2	--	--	--	82.9	5.2	9.5	34.7	418.8	644.7	17.0	--	8.4	1,221.2
Union	3,664.2	12.7	--	12.7	194.2	14.1	166.7	94.0	1,084.3	1,902.9	40.9	--	154.4	3,651.5
Walworth	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Washabaugh	3,179.6	675.1	18.3	693.4	180.7	15.5	2.4	330.5	603.9	1,241.6	88.9	--	22.7	2,486.2
Yankton	6,032.2	--	--	--	361.6	17.4	142.6	114.9	2,711.0	2,429.2	106.9	--	148.6	6,032.2
Ziebach	1,820.8	64.6	8.2	72.8	134.3	11.6	38.6	90.9	343.4	1,009.8	67.6	--	51.8	1,748.0
All counties	176,399.5	38,644.4	663.4	39,307.8	9,832.1	1,482.4	3,037.5	7,832.9	31,936.4	77,327.7	2,578.9	--	3,063.8	137,091.7

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

[3/] Only the portions of these counties east of the 103rd meridian are included in the area surveyed by the North Central Forest Experiment Station.

Table 33.--Net volume of growing stock on commercial forest land by species group and diameter class, Eastern South Dakota, 1980[1/]

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS													
Ponderosa pine	11,324	1,370	2,885	1,831	1,407	1,067	1,523	643	374	95	--	129	--
Juniper	641	280	235	103	--	25	--	--	--	--	--	--	--
Total	11,965	1,650	3,120	1,933	1,407	1,092	1,523	643	374	95	--	129	--
HARDWOODS													
Oak	3,023	356	548	363	596	373	479	151	90	--	67	--	--
Basswood	602	--	50	284	268	--	--	--	--	--	--	--	--
Soft maple	622	--	--	--	--	118	114	--	194	--	--	--	196
Elm	3,873	740	760	713	270	455	187	150	275	91	232	--	--
Ash	11,744	1,512	2,038	1,775	1,969	625	1,421	1,106	589	332	377	--	--
Cottonwood	17,230	596	73	1,020	766	1,155	836	658	1,593	1,242	3,963	4,251	1,078
Willow	698	--	--	92	116	136	94	172	--	--	88	--	--
Hackberry	281	61	220	--	--	--	--	--	--	--	--	--	--
Other hardwoods	1,868	134	493	519	48	192	106	56	63	171	87	--	--
Total	39,941	3,399	4,182	4,766	4,033	3,054	3,237	2,292	2,804	1,835	4,814	4,251	1,274
All species	51,907	5,049	7,301	6,699	5,440	4,146	4,761	2,935	3,178	1,930	4,814	4,379	1,274

[1/] Tables may not add to total due to rounding.

Table 34.--Net volume of sawtimber on commercial forest land by species group and diameter class, Eastern South Dakota, 1980[1/]

(In thousand board feet)[2/]

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS											
Ponderosa pine	38,644	9,683	7,148	5,451	8,875	3,768	2,361	576	--	783	--
Juniper	663	546	--	117	--	--	--	--	--	--	--
Total	39,308	10,229	7,148	5,568	8,875	3,768	2,361	576	--	783	--
HARDWOODS											
Oak	9,832	--	3,303	1,939	2,903	946	394	--	347	--	--
Basswood	1,482	--	1,482	--	--	--	--	--	--	--	--
Soft maple	3,038	--	--	603	288	--	1,420	--	--	--	726
Elm	7,833	--	1,187	2,228	860	849	1,033	406	1,270	--	--
Ash	31,936	--	9,500	2,991	7,068	5,272	2,827	1,924	2,355	--	--
Cottonwood	77,328	--	3,678	5,478	4,352	3,469	7,770	6,742	19,588	20,743	5,510
Willow	2,579	--	477	348	357	751	--	--	647	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	3,064	--	475	1,030	404	161	198	626	170	--	--
Total	137,092	--	20,103	14,616	16,232	11,447	13,641	9,698	24,377	20,743	6,236
All species	176,400	10,229	27,251	20,184	25,107	15,215	16,002	10,274	24,377	21,526	6,236

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

Table 35.--Net volume of growing stock on commercial forest land by species group and forest type, Eastern South Dakota 1980[1/]

(In thousand cubic feet)

Species group	All types	Forest type					
		Ponderosa pine	Oak	Elm-ash	Cottonwood	Plains hardwoods	Nonstocked
SOFTWOODS							
Ponderosa pine	11,324	10,880	--	445	--	--	--
Juniper	641	--	--	358	43	216	25
Total	11,965	10,880	--	802	43	216	25
HARDWOODS							
Oak	3,023	55	959	1,530	--	357	122
Basswood	602	--	--	390	--	212	--
Soft maple	622	--	--	426	--	196	--
Elm	3,873	57	--	3,371	80	160	206
Ash	11,744	--	651	8,429	744	1,713	207
Cottonwood	17,230	124	--	1,297	14,891	918	--
Willow	698	--	88	428	182	--	--
Hackberry	281	--	--	208	--	--	73
Other hardwoods	1,868	--	77	1,054	--	638	100
Total	39,941	236	1,776	17,133	15,896	4,193	709
All species	51,907	11,116	1,776	17,935	15,939	4,409	733

[1/] Tables may not add to total due to rounding.

Table 36.--Net volume of sawtimber on commercial forest land by species group and forest type, Eastern South Dakota, 1980[1/]

(In thousand board feet)[2/]

Species group	All types	Forest type					
		Ponderosa pine	Oak	Elm-ash	Cottonwood	Plains hardwoods	Nonstocked
SOFTWOODS							
Ponderosa pine	38,644	36,015	--	2,630	--	--	--
Juniper	663	--	--	--	--	546	117
Total	39,308	36,015	--	2,630	--	546	117
HARDWOODS							
Oak	9,832	--	4,747	4,292	--	793	--
Basswood	1,482	--	--	1,081	--	402	--
Soft maple	3,038	--	--	2,311	--	726	--
Elm	7,833	395	--	6,192	320	926	--
Ash	31,936	--	2,635	21,733	1,934	5,251	385
Cottonwood	77,328	584	--	6,754	65,169	4,820	--
Willow	2,579	--	647	1,666	266	--	--
Hackberry	--	--	--	--	--	--	--
Other hardwoods	3,064	--	216	2,159	--	211	478
Total	137,092	979	8,244	46,188	67,689	13,130	862
All species	176,400	36,994	8,244	48,818	67,689	13,676	979

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

Table 37.--Net volume of growing stock on commercial forest land by species group and ownership class, Eastern South Dakota, 1980[1/]

(In thousand cubic feet)

Species group	All classes	Ownership class					
		Federal	Indian	State	County and municipal	Farmer	Misc. private
SOFTWOODS							
Ponderosa pine	11,324	--	11,324	--	--	--	--
Juniper	641	--	25	--	--	617	--
Total	11,965	--	11,349	--	--	617	--
HARDWOODS							
Oak	3,023	--	950	209	--	1,864	--
Basswood	602	--	268	212	--	122	--
Soft maple	622	--	--	--	--	622	--
Elm	3,873	--	768	76	--	2,886	144
Ash	11,744	--	2,684	159	146	8,494	262
Cottonwood	17,230	--	1,067	--	3,476	12,506	181
Willow	698	--	172	--	--	527	--
Hackberry	281	--	--	--	--	281	--
Other hardwoods	1,868	--	57	--	--	1,811	--
Total	39,941	--	5,966	655	3,622	29,112	587
All species	51,907	--	17,315	655	3,622	29,729	587

[1/]Tables may not add to total due to rounding.

Table 38.--Net volume of sawtimber on commercial forest land by species group and ownership class, Eastern South Dakota, 1980[1/]

(In thousand board feet)[2/]

Species group	All classes	Ownership class					
		Federal	Indian	State	County and municipal	Farmer	Misc. private
SOFTWOODS							
Ponderosa pine	38,644	--	38,644	--	--	--	--
Juniper	663	--	117	--	--	546	--
Total	39,308	--	38,761	--	--	546	--
HARDWOODS							
Oak	9,832	--	2,471	793	--	6,568	--
Basswood	1,482	--	1,081	402	--	--	--
Soft maple	3,038	--	--	--	--	3,038	--
Elm	7,833	--	2,861	392	--	4,580	--
Ash	31,936	--	3,898	435	--	27,604	--
Cottonwood	77,328	--	5,758	--	15,671	55,009	889
Willow	2,579	--	751	--	--	1,828	--
Hackberry	--	--	--	--	--	--	--
Other hardwoods	3,064	--	--	--	--	3,064	--
Total	137,092	--	16,819	2,022	15,671	101,691	889
All species	176,400	--	55,581	2,022	15,671	102,237	889

[1/]Tables may not add to total due to rounding.

[2/]International 1/4-inch rule.

Table 39.--Net volume of growing stock on commercial forest land by forest type and stand-age class, Eastern South Dakota, 1980[1/]

(In thousand cubic feet)

Forest type	All classes	Stand-age class (years)												
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Ponderosa pine	11,116	--	--	--	533	--	1,850	5,362	1,585	579	1,207	--	--	--
Oak	1,776	60	--	--	--	--	--	--	910	--	--	805	--	--
Elm-ash	17,935	3,217	758	1,634	1,708	833	3,137	1,357	1,571	676	--	2,510	535	--
Cottonwood	15,939	--	--	--	--	1,698	--	340	2,256	3,275	5,682	2,170	519	--
Plains hardwoods	4,409	1,136	146	--	1,687	--	--	655	--	787	--	--	--	--
Nonstocked	733	264	--	122	--	44	55	249	--	--	--	--	--	--
All types	51,907	4,677	904	1,756	3,928	2,575	5,041	7,962	6,322	5,316	6,889	5,485	1,053	--

[1/]Tables may not add to total due to rounding.

Table 40.--Net volume of sawtimber on commercial forest land by forest type and stand-age class, Eastern South Dakota, 1980[1/]

(In thousand board feet)[2/]

Forest type	All classes	Stand-age class (years)												
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Ponderosa pine	36,994	--	--	--	1,410	--	5,141	17,030	6,447	2,808	4,158	--	--	--
Oak	8,244	316	--	--	--	--	--	--	4,209	--	--	3,719	--	--
Elm-ash	48,818	9,918	--	1,585	2,213	889	10,375	748	6,467	2,135	--	11,903	2,586	--
Cottonwood	67,689	--	--	--	--	3,043	--	1,403	7,231	16,723	26,219	10,614	2,456	--
Plains hardwoods	13,676	3,464	--	--	4,820	--	--	2,022	--	3,370	--	--	--	--
Nonstocked	979	117	--	--	--	--	385	478	--	--	--	--	--	--
All types	176,400	13,815	--	1,585	8,444	3,932	15,901	21,681	24,353	25,036	30,377	26,236	5,042	--

[1/]Tables may not add to total due to rounding.

[2/]International 1/4-inch rule.

Table 41.--Net volume of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Eastern South Dakota, 1980[1/]

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Ponderosa pine															
Sawtimber	6,631	--	--	554	--	--	1,117	828	1,030	--	1,207	--	1,894	--	--
Poletimber	4,484	--	--	402	533	--	--	--	--	--	1,312	--	2,237	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	11,116	--	--	956	533	--	1,117	828	1,030	--	2,519	--	4,131	--	--
Oak															
Sawtimber	1,715	--	--	--	--	--	--	1,715	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	60	--	--	--	--	--	60	--	--	--	--	--	--	--	--
All stands	1,776	--	--	--	--	--	60	1,715	--	--	--	--	--	--	--
Elm-ash															
Sawtimber	7,079	--	--	--	311	1,013	1,622	676	2,484	--	--	973	--	--	--
Poletimber	6,881	--	--	--	580	288	--	247	--	587	3,005	818	1,357	--	--
Sapling & seedling	3,975	--	175	440	587	306	1,377	1,090	--	--	--	--	--	--	--
All stands	17,935	--	175	440	1,478	1,607	2,999	2,013	2,484	587	3,005	1,791	1,357	--	--
Cottonwood															
Sawtimber	15,001	--	--	340	519	1,535	1,157	1,013	1,481	--	6,751	--	2,206	--	--
Poletimber	938	--	--	--	--	938	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	15,939	--	--	340	519	2,473	1,157	1,013	1,481	--	6,751	--	2,206	--	--
Plains hardwoods															
Sawtimber	1,442	--	--	--	--	--	--	--	787	655	--	--	--	--	--
Poletimber	1,687	--	--	--	--	204	--	--	--	--	1,483	--	--	--	--
Sapling & seedling	1,281	--	--	--	--	645	636	--	--	--	--	--	--	--	--
All stands	4,409	--	--	--	--	849	636	--	787	655	1,483	--	--	--	--
Nonstocked	733	--	--	69	122	55	--	249	239	--	--	--	--	--	--
All types															
Sawtimber	31,868	--	--	894	830	2,548	3,896	4,232	5,782	655	7,958	973	4,100	--	--
Poletimber	13,990	--	--	402	1,113	1,430	--	247	--	587	5,800	818	3,594	--	--
Sapling & seedling	5,316	--	175	440	587	951	2,073	1,090	--	--	--	--	--	--	--
Nonstocked	733	--	--	69	122	55	--	249	239	--	--	--	--	--	--
All stands	51,907	--	175	1,805	2,652	4,984	5,970	5,817	6,021	1,242	13,758	1,791	7,694	--	--

[1/] Tables may not add to total due to rounding.

Table 42.--Net volume of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Eastern South Dakota, 1980[1/]

(In thousand board feet)[2/]

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Ponderosa pine															
Sawtimber	26,825	--	--	2,802	--	--	4,417	3,217	3,645	--	4,158	--	8,587	--	--
Poletimber	10,168	--	--	1,117	1,410	--	--	--	--	--	3,532	--	4,109	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	36,994	--	--	3,919	1,410	--	4,417	3,217	3,645	--	7,690	--	12,696	--	--
Oak															
Sawtimber	7,928	--	--	--	--	--	--	7,928	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	316	--	--	--	--	--	316	--	--	--	--	--	--	--	--
All stands	8,244	--	--	--	--	--	316	7,928	--	--	--	--	--	--	--
Elm-ash															
Sawtimber	30,378	--	--	--	1,647	4,573	6,512	2,135	11,508	--	--	4,004	--	--	--
Poletimber	8,522	--	--	--	1,296	--	--	--	--	889	3,631	1,958	748	--	--
Sapling & seedling	9,918	--	--	2,062	1,728	785	5,342	--	--	--	--	--	--	--	--
All stands	48,818	--	--	2,062	4,671	5,358	11,854	2,135	11,508	889	3,631	5,962	748	--	--
Cottonwood															
Sawtimber	66,560	--	--	1,403	2,456	4,867	6,137	4,476	4,278	--	32,394	--	10,548	--	--
Poletimber	1,129	--	--	--	--	1,129	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	67,689	--	--	1,403	2,456	5,996	6,137	4,476	4,278	--	32,394	--	10,548	--	--
Plains hardwoods															
Sawtimber	5,392	--	--	--	--	--	--	--	3,370	2,022	--	--	--	--	--
Poletimber	4,820	--	--	--	--	--	--	--	--	--	4,820	--	--	--	--
Sapling & seedling	3,464	--	--	--	--	376	3,088	--	--	--	--	--	--	--	--
All stands	13,676	--	--	--	--	376	3,088	--	3,370	2,022	4,820	--	--	--	--
Nonstocked	979	--	--	117	--	385	--	478	--	--	--	--	--	--	--
All types															
Sawtimber	137,083	--	--	4,205	4,103	9,440	17,066	17,756	22,801	2,022	36,552	4,004	19,135	--	--
Poletimber	24,639	--	--	1,117	2,706	1,129	--	--	--	889	11,983	1,958	4,857	--	--
Sapling & seedling	13,698	--	--	2,062	1,728	1,161	8,746	--	--	--	--	--	--	--	--
Nonstocked	979	--	--	117	--	385	--	478	--	--	--	--	--	--	--
All stands	176,400	--	--	7,502	8,537	12,114	25,813	18,234	22,801	2,911	48,535	5,962	23,992	--	--

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

Table 43.--Net volume of sawtimber on commercial forest land by species group and butt log-grade, Eastern South Dakota, 1980[1/]

(In thousand board feet)[2/]

Species group	All grades	Log grade			
		1	2	3	Tie and timber
SOFTWOODS					
Ponderosa pine	38,644	783	--	37,862	--
Juniper	663	--	--	663	--
Total	39,308	783	--	38,525	--
HARDWOODS					
Oak	9,832	--	741	8,653	438
Basswood	1,482	--	427	1,055	--
Soft maple	3,038	1,420	603	1,015	--
Elm	7,833	950	722	5,382	779
Ash	31,936	3,031	3,948	24,197	761
Cottonwood	77,328	17,962	29,672	28,982	711
Willow	2,579	--	485	2,094	--
Hackberry	--	--	--	--	--
Other hardwoods	3,064	--	404	2,660	--
Total	137,092	23,363	37,001	74,039	2,689
All species	176,400	24,146	37,001	112,564	2,689

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

Table 44.--Net volume of short-log trees on commercial forest land by species group and diameter class, Eastern South Dakota, 1980[1/]

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS											
Ponderosa pine	245	150	--	95	--	--	--	--	--	--	--
Juniper	--	--	--	--	--	--	--	--	--	--	--
Total	245	150	--	95	--	--	--	--	--	--	--
HARDWOODS											
Oak	799	--	345	262	73	--	118	--	--	--	--
Basswood	128	--	128	--	--	--	--	--	--	--	--
Soft maple	176	--	--	--	--	176	--	--	--	--	--
Elm	798	--	341	138	107	140	--	72	--	--	--
Ash	558	--	214	--	173	121	--	--	49	--	--
Cottonwood	709	--	189	--	--	--	107	120	195	98	--
Willow	87	--	87	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	649	--	165	--	238	63	82	--	101	--	--
Total	3,903	--	1,469	400	591	500	308	192	345	98	--
All species	4,148	150	1,469	495	591	500	308	192	345	98	--

[1/] Tables may not add to total due to rounding.

Table 45.--Net volume of short-log trees on commercial forest land by species group and diameter class, Eastern South Dakota, 1980[1/]

(In thousand board feet)[2/]

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS											
Ponderosa pine	735	600	--	136	--	--	--	--	--	--	--
Juniper	--	--	--	--	--	--	--	--	--	--	--
Total	735	600	--	136	--	--	--	--	--	--	--
HARDWOODS											
Oak	3,971	--	1,772	1,371	298	--	531	--	--	--	--
Basswood	405	--	405	--	--	--	--	--	--	--	--
Soft maple	754	--	--	--	--	754	--	--	--	--	--
Elm	3,013	--	1,327	587	576	368	--	157	--	--	--
Ash	2,357	--	885	--	579	825	--	--	69	--	--
Cottonwood	2,320	--	643	--	--	--	274	424	674	304	--
Willow	317	--	317	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	2,546	--	635	--	881	412	340	--	278	--	--
Total	15,682	--	5,982	1,958	2,332	2,359	1,145	580	1,021	304	--
All species	16,417	600	5,982	2,093	2,332	2,359	1,145	580	1,021	304	--

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

Table 46.--Net annual growth of growing stock on commercial forest land by species group and ownership class, Eastern South Dakota, 1979[1/]

(In thousand cubic feet)

Species group	All classes	Ownership class					
		Federal	Indian	State	County and municipal	Farmer	Misc. private
SOFTWOODS							
Ponderosa pine	344	--	344	--	--	--	--
Juniper	15	--	1	--	--	15	--
Total	359	--	345	--	--	15	--
HARDWOODS							
Oak	57	--	12	2	--	43	--
Basswood	14	--	11	1	--	2	--
Soft maple	16	--	--	--	--	16	--
Elm	217	--	24	-4	--	188	8
Ash	363	--	143	2	10	197	11
Cottonwood	290	--	11	--	34	239	5
Willow	24	--	5	--	--	19	--
Hackberry	9	--	--	--	--	9	--
Other hardwoods	102	--	1	--	--	101	--
Total	1,093	--	208	1	44	815	25
All species	1,452	--	553	1	44	829	25

[1/] Tables may not add to total due to rounding.

Table 47.--Net annual growth of sawtimber on commercial forest land by species group and ownership class, Eastern South Dakota, 1979[1/]

(In thousand board feet)[2/]

Species group	All classes	Ownership class					
		Federal	Indian	State	County and municipal	Farmer	Misc. private
SOFTWOODS							
Ponderosa pine	2,425	--	2,425	--	--	--	--
Juniper	14	--	3	--	--	11	--
Total	2,439	--	2,428	--	--	11	--
HARDWOODS							
Oak	254	--	38	46	--	171	--
Basswood	47	--	47	--	--	--	--
Soft maple	289	--	--	--	--	289	--
Elm	445	--	93	7	--	345	--
Ash	2,089	--	854	7	--	1,227	--
Cottonwood	1,556	--	47	--	143	1,343	24
Willow	141	--	32	--	--	110	--
Hackberry	--	--	--	--	--	--	--
Other hardwoods	288	--	--	--	--	288	--
Total	5,109	--	1,111	60	143	3,772	24
All species	7,548	--	3,538	60	143	3,782	24

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

Table 48.--Net annual growth of growing stock on commercial forest land by species group and forest type, Eastern South Dakota, 1979[1/]

(In thousand cubic feet)

Species group	All types	Forest type					
		Ponderosa pine	Oak	Elm-ash	Cottonwood	Plains hardwoods	Nonstocked
SOFTWOODS							
Ponderosa pine	344	347	--	5	--	--	-8
Juniper	15	--	--	11	--	4	1
Total	359	347	--	15	--	4	-8
HARDWOODS							
Oak	57	2	24	20	--	8	4
Basswood	14	--	--	13	--	1	--
Soft maple	16	--	--	9	--	8	--
Elm	217	--	--	200	6	-2	13
Ash	363	--	13	272	27	46	6
Cottonwood	290	--	--	15	261	14	--
Willow	24	--	2	18	5	--	--
Hackberry	9	--	--	5	--	--	4
Other hardwoods	102	--	3	60	--	33	6
Total	1,093	2	42	610	298	108	32
All species	1,452	350	42	626	298	112	24

[1/] Tables may not add to total due to rounding.

Table 49.--Net annual growth of sawtimber on commercial forest land by species group and forest type, Eastern South Dakota, 1979[1/]

(In thousand board feet)[2/]

Species group	All types	Forest type					
		Ponderosa pine	Oak	Elm-ash	Cottonwood	Plains hardwoods	Nonstocked
SOFTWOODS							
Ponderosa pine	2,425	2,406	--	24	--	--	-5
Juniper	14	--	--	--	--	11	3
Total	2,439	2,406	--	24	--	11	-2
HARDWOODS							
Oak	254	--	112	97	--	46	--
Basswood	47	--	--	47	--	--	--
Soft maple	289	--	--	242	--	47	--
Elm	445	24	--	344	57	20	--
Ash	2,089	--	53	1,842	54	133	7
Cottonwood	1,556	--	--	65	1,434	57	--
Willow	141	--	11	113	18	--	--
Hackberry	--	--	--	--	--	--	--
Other hardwoods	288	--	22	207	--	40	20
Total	5,109	24	197	2,957	1,562	343	26
All species	7,548	2,430	197	2,980	1,562	353	25

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

Table 50.--Net annual growth of growing stock on commercial forest land by forest type and stand-age class, Eastern South Dakota, 1979[1/]

(In thousand cubic feet)

Forest type	All classes	Stand-age class (years)												
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Ponderosa pine	350	--	--	--	22	--	41	213	44	--	30	--	--	--
Oak	42	--	--	--	--	--	--	--	20	--	--	23	--	--
Elm-ash	626	135	5	164	97	35	45	38	33	37	--	26	10	--
Cottonwood	298	--	--	--	--	55	--	-1	101	55	49	30	10	--
Plains hardwoods	112	31	10	--	52	--	--	1	--	18	--	--	--	--
Nonstocked	24	1	--	4	--	5	1	13	--	--	--	--	--	--
All types	1,452	167	15	168	171	96	87	265	197	110	79	79	20	--

[1/] Tables may not add to total due to rounding.

Table 51.--Net annual growth of sawtimber on commercial forest land by forest type and stand-age class, Eastern South Dakota, 1979[1/]

(In thousand board feet)[2/]

Forest type	All classes	Stand-age class (years)												
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Ponderosa pine	2,430	--	--	--	27	--	173	1,536	154	--	539	--	--	--
Oak	197	--	--	--	--	--	--	--	78	--	--	120	--	--
Elm-ash	2,980	389	--	128	711	24	625	25	237	375	--	444	21	--
Cottonwood	1,562	--	--	--	--	133	--	156	734	208	195	96	40	--
Plains hardwoods	353	118	--	--	57	--	--	60	--	118	--	--	--	--
Nonstocked	25	-2	--	--	--	--	7	20	--	--	--	--	--	--
All types	7,548	506	--	128	796	157	805	1,797	1,203	702	734	659	61	--

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

Table 52.--Timber removals from growing stock and sawtimber on commercial forest land by species group, Eastern South Dakota, 1964 and 1979[1/]

Species group	Growing stock		Sawtimber	
	1964[2/]	1979	1964[2/]	1979
	Thousand cubic feet		Thousand board feet[3/]	
SOFTWOODS				
Ponderosa pine	491	91	859	309
Juniper	75	48	--	4
Total	566	139	859	313
HARDWOODS				
Oak	302	45	704	106
Basswood	40	12	21	25
Soft maple	20	13	35	55
Elm	362	395	1,014	1,083
Ash	598	313	1,158	808
Cottonwood	1,223	778	5,511	2,997
Willow	43	18	117	43
Hackberry	3	6	2	--
Other hardwoods	43	43	72	141
Total	2,634	1,623	8,634	5,258
All species	3,200	1,762	9,493	5,571

[1/] Removals in 1979 are trend-level removals. Tables may not add to total due to rounding.

[2/] Figures have been adjusted from those published after the 1965 survey to conform to 1980 volumes because of changes in survey definitions and procedures.

[3/] International 1/4-inch rule.

Table 53.--Timber removals from growing stock and sawtimber on commercial forest land by item and species category, Eastern South Dakota, 1979[1/]

Item	All species	Softwoods	Oak	Elm-hackberry	Ash	Cottonwood	Other hardwoods
	GROWING STOCK						
	Species category						
	Thousand cubic feet						
ROUNDWOOD PRODUCTS							
Saw logs	303	[2/]	2	43	47	198	13
Fuelwood	342	--	--	245	5	88	4
Posts	34	34	--	--	--	--	--
Total	679	34	2	288	52	286	17
LOGGING RESIDUE	57	--	--	8	7	40	2
OTHER REMOVALS	1,026	105	43	105	254	452	67
ALL TIMBER REMOVALS	1,762	139	45	401	313	778	86
	SAWTIMBER						
	Thousand board feet[3/]						
ROUNDWOOD PRODUCTS							
Saw logs	1,642	4	13	232	264	1,059	70
Fuelwood	976	--	--	682	20	254	20
Posts	--	--	--	--	--	--	--
Total	2,618	4	13	914	284	1,313	90
LOGGING RESIDUE	182	--	1	29	13	130	9
OTHER REMOVALS	2,771	309	92	140	511	1,554	165
ALL TIMBER REMOVALS	5,571	313	106	1,083	808	2,997	264

[1/] Tables may not add to total due to rounding.

[2/] Nominal amount rounded to zero.

[3/] International 1/4-inch rule.

Table 54.--Net annual growth and removals of growing stock on commercial forest land by species group, Eastern South Dakota, 1979[1/]

(In thousand cubic feet)

Species group	Net annual growth	Annual timber removals
SOFTWOODS		
Ponderosa pine	344	91
Juniper	15	48
Total	359	139
HARDWOODS		
Oak	57	45
Basswood	14	12
Soft maple	16	13
Elm	217	395
Ash	363	313
Cottonwood	290	778
Willow	24	18
Hackberry	9	6
Other hardwoods	102	43
Total	1,093	1,623
All species	1,452	1,762

[1/] Tables may not add to total due to rounding.

Table 55.--Net annual growth and removals of sawtimber on commercial forest land by species group, Eastern South Dakota, 1979[1/]

(In thousand board feet)[2/]

Species group	Net annual growth	Annual timber removals
SOFTWOODS		
Ponderosa pine	2,425	309
Juniper	14	4
Total	2,439	313
HARDWOODS		
Oak	254	106
Basswood	47	25
Soft maple	289	55
Elm	445	1,083
Ash	2,089	808
Cottonwood	1,556	2,997
Willow	141	43
Hackberry	--	--
Other hardwoods	288	141
Total	5,109	5,258
All species	7,548	5,571

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

Table 56.--Net annual growth and removals of growing stock on commercial forest land by ownership class and softwoods and hardwoods, Eastern South Dakota, 1979[1/]

(In thousand cubic feet)

Ownership class	Net annual growth			Annual timber removals		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
Federal	--	--	--	6	--	6
Indian	553	345	208	34	34	--
State	1	--	1	--	--	--
County & municipal	44	--	44	--	--	--
Farmer and Misc. private	854	15	840	1,722	105	1,617
All owners	1,452	359	1,093	1,762	139	1,623

[1/]Tables may not add to total due to rounding.

Table 57.--Net annual growth and removals of sawtimber on commerical forest land by ownership class and softwoods and hardwoods, Eastern South Dakota, 1979[1/]

(In thousand board feet)[2/]

Ownership class	Net annual growth			Annual timber removals		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
Federal	--	--	--	17	--	17
Indian	3,538	2,428	1,111	--	--	--
State	60	--	60	--	--	--
County & municipal	143	--	143	--	--	--
Farmer and Misc. private	3,806	11	3,796	5,554	313	5,241
All owners	7,548	2,439	5,110	5,571	313	5,258

[1/]Tables may not add to total due to rounding.

[2/]International 1/4-inch rule.

Table 58.--Annual mortality of growing stock on commercial forest land by species group and cause, Eastern South Dakota, 1979[1/]

(In thousand cubic feet)

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
SOFTWOODS								
Ponderosa pine	9	--	--	9	--	--	--	--
Juniper	1	--	--	--	--	--	--	1
Total	10	--	--	9	--	--	--	1
HARDWOODS								
Oak	3	--	--	--	--	--	--	3
Basswood	1	--	--	--	--	--	--	1
Soft maple	5	--	5	--	--	--	--	--
Elm	54	--	51	--	--	--	--	2
Ash	61	--	30	--	--	--	--	31
Cottonwood	31	--	14	--	--	--	--	17
Willow	1	--	--	--	--	--	--	1
Hackberry	1	--	--	--	--	--	--	1
Other hardwoods	9	--	--	--	--	--	--	9
Total	166	--	100	--	--	--	--	65
All species	176	--	100	9	--	--	--	66

[1/]Tables may not add to total due to rounding.

Table 59.--Annual mortality of sawtimber on commercial forest land by species group and cause, Eastern South Dakota, 1979[1/]

(In thousand board feet)[2/]

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
SOFTWOODS								
Ponderosa pine	6	--	--	5	--	--	--	--
Juniper	1	--	--	--	--	--	--	1
Total	6	--	--	5	--	--	--	1
HARDWOODS								
Oak	12	--	--	--	--	--	--	12
Basswood	4	--	--	--	--	--	--	4
Soft maple	--	--	--	--	--	--	--	--
Elm	55	--	55	--	--	--	--	--
Ash	169	--	166	--	--	--	--	2
Cottonwood	63	--	63	--	--	--	--	--
Willow	10	--	--	--	--	--	--	10
Hackberry	--	--	--	--	--	--	--	--
Other hardwoods	5	--	--	--	--	--	--	5
Total	318	--	284	--	--	--	--	33
All species	323	--	284	5	--	--	--	34

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

Table 60.--Annual mortality of growing stock and sawtimber on commercial forest land by ownership class and softwoods and hardwoods, Eastern South Dakota, 1980[1/]

Ownership class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	- - - - Thousand cubic feet- - - -			- - - - Thousand board feet[2/] - - - -		
Federal	--	--	--	--	--	--
Indian	31	9	22	78	5	73
State	5	--	5	--	--	--
County and municipal	1	--	1	2	--	2
Farmer	137	1	136	241	1	241
Misc. private	2	--	2	3	--	3
All owners	176	10	166	323	6	318

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

Table 61.--Output of timber products by product, softwoods and hardwoods, and source of material, Eastern South Dakota, 1978[1/]

Product and softwoods and hardwoods	Standard units	Total		Roundwood products				Plant byproducts	
				Growing stock		Non-growing stock			
		No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet
SAW LOGS									
Softwood	Thousand board feet[3/]	4	[2/]	4	[2/]	--	--	--	--
Hardwood		1,827	315	1,757	303	70	12	--	--
Total		1,831	315	1,761	303	70	12	--	--
FUELWOOD									
Softwood	Standard[4/] cords	3	[2/]	1	[2/]	2	[2/]	1	[2/]
Hardwood		12,093	800	5,189	342	6,205	409	699	49
Total		12,096	800	5,190	342	6,207	409	700	49
POSTS									
Softwood	Thousand pieces	72	45	54	34	18	11	--	--
Hardwood		--	--	--	--	--	--	--	--
Total		72	45	54	34	18	11	--	--
OTHER[5/]									
Softwood	Thousand cubic feet	--	--	--	--	--	--	--	--
Hardwood		40	40	--	--	--	--	40	40
Total		40	40	--	--	--	--	40	40
ALL PRODUCTS									
Softwood	Thousand cubic feet	45	45	34	34	11	11	[2/]	[2/]
Hardwood		1,155	1,155	645	645	421	421	89	89
Total		1,200	1,200	679	679	432	432	89	89

[1/] Tables may not add to total due to rounding.

[2/] Nominal quantity rounded to zero.

[3/] International 1/4-inch rule.

[4/] Rough-wood, 128 cubic-foot basis.

[5/] Includes charcoal wood, livestock bedding, mulch, and specialty items.

Table 63.--Timber products from roundwood by species group and product, Eastern South Dakota, 1979[1/]

Species group	All products	Saw logs		Fuelwood		Posts	
	Thousand cubic feet	Thousand[2/] board feet	Thousand cubic feet	Cords	Thousand cubic feet	Thousand pieces	Thousand cubic feet
SOFTWOODS							
Ponderosa pine	--	2	--	--	--	--	--
Juniper	45	2	--	2	--	72	45
Total	45	4	--	2	--	72	45
HARDWOODS							
Oak	2	14	2	--	--	--	--
Basswood	--	--	--	--	--	--	--
Soft maple	1	6	1	--	--	--	--
Elm	581	259	45	7,959	536	--	--
Ash	56	288	48	238	8	--	--
Cottonwood	405	1,187	207	2,960	198	--	--
Willow	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--
Black walnut	2	15	2	--	--	--	--
Boxelder	9	--	--	237	9	--	--
Other hardwoods	10	58	10	--	--	--	--
Total	1,066	1,827	315	11,394	751	--	--
All species	1,111	1,831	315	11,396	751	72	45

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

Table 62.--Output of roundwood products by product, softwoods and hardwoods, and source of material, Eastern South Dakota, 1979[1/]

(In thousand cubic feet)

Product and softwoods and hardwoods	All sources	Growing-stock trees			Rough and rotten trees	Salvable dead trees	Other sources
		Total	Sawtimber	Poletimber			
INDUSTRIAL PRODUCTS							
Saw logs							
Softwood	--	--	--	--	--	--	--
Hardwood	315	303	287	16	6	--	6
Subtotal	315	303	287	16	6	--	6
Posts (Round and split)							
Softwood	45	34	5	29	--	--	11
Hardwood	--	--	--	--	--	--	--
Subtotal	45	34	5	29	--	--	11
All industrial products							
Softwood	45	34	5	29	--	--	11
Hardwood	315	303	287	16	6	--	6
Total	360	337	292	45	6	--	17
FUELWOOD							
Softwood	--	--	--	--	--	--	--
Hardwood	751	342	189	153	162	5	242
Total	751	342	189	153	162	5	242
ALL PRODUCTS							
Softwood	45	34	5	29	--	--	11
Hardwood	1,066	645	476	169	168	5	248
Total	1,111	679	481	198	168	5	259

[1/] Tables may not add to total due to rounding.

Table 63.--Timber products from roundwood by species group and product, Eastern South Dakota, 1979[1/]

Species group	All products	Saw logs		Fuelwood		Posts	
	Thousand cubic feet	Thousand[2/] board feet	Thousand cubic feet	Cords	Thousand cubic feet	Thousand pieces	Thousand cubic feet
SOFTWOODS							
Ponderosa pine	--	2	--	--	--	--	--
Juniper	45	2	--	2	--	72	45
Total	45	4	--	2	--	72	45
HARDWOODS							
Oak	2	14	2	--	--	--	--
Basswood	--	--	--	--	--	--	--
Soft maple	1	6	1	--	--	--	--
Elm	581	259	45	7,959	536	--	--
Ash	56	288	48	238	8	--	--
Cottonwood	405	1,187	207	2,960	198	--	--
Willow	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--
Black walnut	2	15	2	--	--	--	--
Boxelder	9	--	--	237	9	--	--
Other hardwoods	10	58	10	--	--	--	--
Total	1,066	1,827	315	11,394	751	--	--
All species	1,111	1,831	315	11,396	751	72	45

[1/] Tables may not add to total due to rounding.

[2/] International 1/4-inch rule.

Table 64.--Volume of primary plant residue by type of use and kind of material, Eastern South Dakota, 1979[1/]

(In thousand cubic feet)

Type of use	Total		Kind of wood residue					
			Coarse[2/]		Fine[3/]		Bark	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Fiber products	--	--	--	--	--	--	--	--
Industrial fuel	--	--	--	--	--	--	--	--
Domestic fuel	0.1	48.9	0.1	48.9	--	--	--	31.0
Miscellaneous[4/]	0.1	40.2	--	0.3	0.1	39.9	--	--
Not used[5/]	--	26.8	--	24.0	--	2.8	0.1	16.3
Total	0.2	115.9	0.1	73.2	0.1	42.7	0.1	47.3

[1/] Tables may not add to total due to rounding.

[2/] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[3/] Not suitable for chipping such as sawdust, veneer clippings, etc.

[4/] Livestock bedding, mulch, small dimension, charcoal, and specialty items.

[5/] Includes residue burned as waste.

Table 65.--All live shrub biomass yields on commercial forest land by species group and forest type, Eastern South Dakota, 1980[1/]

(In pounds per acre green weight)

Species group	Forest type					
	Ponderosa pine	Oak	Elm-ash	Cottonwood	Plains hardwoods	Nonstocked
TALL SHRUBS						
Eastern redcedar	0.1	--	--	0.1	24.7	--
Juniper	--	--	0.7	--	--	--
Boxelder	2.3	0.1	2.4	3.5	62.1	38.1
Hackberry	--	--	4.2	21.0	--	1.0
Dogwood	--	--	--	122.4	127.3	--
Hawthorn	1.0	--	9.2	--	--	--
Ash	1.8	5.9	69.2	31.3	99.9	11.3
Wild plum	75.8	--	2.5	--	--	--
Leatherwood	--	8.7	--	--	--	--
Red mulberry	--	--	34.7	--	--	--
E. hophornbeam	--	--	0.2	--	--	--
Chokecherry	43.3	259.7	135.6	5.6	35.0	25.3
Oak	--	13.2	--	--	1.5	0.8
Hazel	--	11.8	--	--	--	--
Juneberry	5.4	--	9.2	--	--	--
Alder buckthorn	0.5	0.3	0.5	--	--	--
Sumac	--	--	44.1	5.8	139.7	8.5
Basswood	--	--	0.9	--	--	--
Elm	22.6	1.2	5.3	--	115.8	0.1
Total	152.9	300.8	318.8	189.6	606.0	85.2
LOW SHRUBS						
Rose	14.3	76.4	28.5	7.8	139.5	66.8
Virginia creeper	--	--	9.7	--	79.8	--
Gooseberry-currant	8.7	275.8	25.5	--	3.2	--
Honeysuckle	49.4	--	15.7	--	223.3	--
Snowberry	123.0	521.2	155.7	170.7	17.7	470.9
Raspberry-blackberry	--	--	1.7	--	--	--
Poison ivy	12.6	--	90.2	14.1	33.5	--
Greenbriar	--	--	0.9	--	--	--
Grape	--	--	0.7	33.4	6.7	--
Total	208.1	873.3	328.8	225.9	503.8	537.7
All shrubs	360.9	1,174.2	647.7	415.6	1,109.8	622.9
Number of plots	11	3	31	11	8	10

[1/] Tables may not add to total due to rounding.

Table 66.--All live tree biomass yields on commercial forest land by species group and forest type, Eastern South Dakota, 1980[1/]

(In pounds per acre green weight)

Species group	Forest type					
	Ponderosa pine	Oak	Elm-ash	Cottonwood	Plains hardwoods	Nonstocked
SOFTWOODS						
Ponderosa pine	53,913	--	784	--	--	--
Juniper	2,976	--	497	113	1,800	779
Total	56,889	--	1,281	113	1,800	779
HARDWOODS						
Oak	3,429	47,083	9,453	--	6,209	5,058
Basswood	--	--	1,436	--	3,451	--
Soft maple	--	--	2,103	--	3,323	--
Elm	901	3,801	15,596	784	3,489	4,771
Ash	--	14,452	21,843	8,487	19,843	5,135
Cottonwood	600	--	3,074	86,690	9,629	--
Willow	--	1,827	1,392	1,719	433	--
Hackberry	--	--	1,529	--	--	2,183
Other hardwoods	418	1,584	6,158	614	17,341	5,863
Noncommercial species	--	--	160	--	--	--
Total	5,348	68,747	62,743	98,293	63,719	23,010
All species	62,237	68,747	64,024	98,407	65,518	23,789
Number of plots	11	3	31	11	8	10

[1/]Tables may not add to total due to rounding.

Table 67.--All live tree biomass on commercial forest land by species group and forest type, Eastern South Dakota, 1980[1/]

(In green tons)

Species group	All types	Forest type					
		Ponderosa pine	Oak	Elm-ash	Cottonwood	Plains hardwoods	Nonstocked
SOFTWOODS							
Ponderosa pine	497,659	479,826	--	17,832	--	--	--
Juniper	56,139	26,483	--	11,301	1,050	11,698	5,608
Total	553,798	506,309	--	29,133	1,050	11,698	5,608
HARDWOODS							
Oak	428,273	30,519	105,937	215,045	--	40,357	36,415
Basswood	55,101	--	--	32,667	--	22,434	--
Soft maple	69,442	--	--	47,843	--	21,599	--
Elm	435,655	8,020	8,553	354,800	7,250	22,678	34,353
Ash	773,901	--	32,517	496,930	78,500	128,980	36,974
Cottonwood	939,735	5,336	--	69,926	801,884	62,588	--
Willow	54,501	--	4,110	31,671	15,902	2,818	--
Hackberry	50,503	--	--	34,786	--	--	15,717
Other hardwoods	307,997	3,722	3,564	140,102	5,676	112,718	42,215
Noncommercial species	3,641	--	--	3,641	--	--	--
Total	3,118,747	47,597	154,681	1,427,411	909,213	414,172	165,673
All species	3,672,545	553,906	154,681	1,456,544	910,263	425,870	171,281

[1/]Tables may not add to total due to rounding.

Table 68.--All live tree biomass by species group and tree biomass component, Eastern South Dakota, 1980[1/]

(Green tons)

Species group	All components	Biomass component				
		1- to 5-inch trees	Growing stock		Cull	
			Boles	Tops and limbs	Boles	Tops and limbs
SOFTWOODS						
Ponderosa pine	497,659	42,026	288,666	133,447	22,445	11,075
Juniper	56,139	25,604	10,899	5,143	9,166	5,326
Total	553,798	67,630	299,565	138,591	31,611	16,401
HARDWOODS						
Oak	428,273	54,999	110,186	53,069	140,655	69,364
Basswood	55,101	5,847	16,176	7,773	16,723	8,583
Soft maple	69,442	--	16,637	8,297	27,307	17,201
Elm	435,655	27,411	122,014	61,349	145,448	79,433
Ash	773,901	91,897	337,289	161,149	115,204	68,361
Cottonwood	939,735	8,443	522,861	251,339	100,432	56,660
Willow	54,501	--	21,625	10,475	13,029	9,373
Hackberry	50,503	31,592	8,811	4,005	4,191	1,905
Other hardwoods	307,997	25,750	56,388	28,789	118,470	78,600
Noncommercial species	3,641	3,641	--	--	--	--
Total	3,118,747	249,580	1,211,987	586,243	681,457	389,481
All species	3,672,545	317,210	1,511,552	724,834	713,067	405,882

[1/]Tables may not add to total due to rounding.

Table 69.--Sampling errors for estimates smaller than the Unit totals of volume, net growth, removals, and area of commercial forest land, Eastern South Dakota, 1980[1/]

Sampling error	Commercial forest area	Growing Stock			Sawtimber		
		Inventory	Growth	Removals	Inventory	Growth	Removals
Percent	Thousand acres	Million cubic feet			Million board feet[2/]		
25	262.9	136.1	6.5	2.1	260.0	25.7	5.6
30	182.6	94.5	4.5	1.5	180.5	17.8	3.9
35	134.1	69.4	3.3	1.1	132.6	13.1	2.9
40	102.7	53.2	2.6	0.8	101.6	10.0	2.2
45	81.1	42.0	2.0	0.6	80.2	7.9	1.7
50	65.7	34.0	1.6	0.5	65.0	6.4	1.4
60	45.7	23.6	1.1	0.4	45.1	4.5	1.0
70	33.5	17.4	0.8	0.3	33.2	3.3	0.7
80	25.7	13.3	0.6	0.2	25.4	2.5	0.6
90	20.3	10.5	0.5	0.2	20.1	2.0	0.4
100	16.4	8.5	0.4	0.1	16.2	1.6	0.4

[1/]At the 68-percent probability level. Tables may not add to total due to rounding.

[2/]International 1/4-inch rule.

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The third forest resource inventory of eastern South Dakota showed a 31 percent decline in commercial forest area and 42 percent loss in growing-stock volume between 1965 and 1980.

KEY WORDS: Area, volume, growth, mortality, removals.

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Fuelwood Production and Sources in Wisconsin, 1981

James E. Blyth, Michael E. Bailey, and W. Brad Smith

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FOREWORD

This bulletin contains the results of a detailed study of 1981 fuelwood production and sources in Wisconsin. Such detailed information is necessary for intelligent planning and decision-making in wood procurement, forest resource management and forest industry development. Likewise, researchers need current fuelwood production information for planning projects.

Special thanks are given to the Wisconsin households, primary wood-using firms, and logging firms that supplied information for this study. Their cooperation is greatly appreciated.

Four Wisconsin DNR foresters were the major participants in conducting the phone survey:

Jeffrey F. Olsen-Coordinator
Donald R. Peterson
Dan C. Cobb
David J. Epperly

Their help is greatly appreciated.

Quantities shown may differ slightly from one table to another because of rounding differences, but these differences are insignificant.

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FUELWOOD PRODUCTION AND SOURCES IN WISCONSIN, 1981

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HIGHLIGHTS

From Roundwood

- Total fuelwood production from roundwood in 1981 was 1,916,000 cords.
- Red oak and elm comprised 52 percent of the fuelwood cut.
- Private land provided 92 percent of the fuelwood cut.
- Rural woodland furnished 78 out of every 100 cords of fuelwood. Of the remaining 22 cords out of 100 that were cut from other land classes, 9 cords came from fence rows, windbreaks, and rural yards; 7 cords came from pasture and cropland; 5 cords came from cities and villages, and 1 cord came from other areas.
- Dead trees on commercial forest land (CFL) provided 46 percent of the fuelwood. Nongrowing stock on CFL was four times as important for fuelwood as growing stock on CFL.
- Growing stock on CFL was not a major source of fuelwood. An estimated 296,000 cords (15 percent) came from growing stock on CFL.
- For equal amounts of fuelwood produced by loggers and by households, loggers cut four times as much from growing stock on CFL as did households.
- No county produced more than 18,000 cords of fuelwood from growing stock on CFL.

From Primary Wood-using Mill Residue

- Wisconsin's primary wood-using mills supplied 250,000 cords of wood residue for fuelwood in 1981. Eighty-five percent was hardwood.
- Coarse (chippable) residue constituted about 62 percent of the wood residue burned for fuel; the remainder was fines.
- Industrial customers took three-fifths of the 1981 residue used for fuel; domestic (household) customers used the remainder.

HISTORICAL FUELWOOD DEMAND

Wood was the primary source of energy in the United States until the late 1800's. Between 1949 and 1974 fuelwood use declined steadily for utilities, residences, and commercial businesses, although industrial fuelwood use increased steadily during that period. Wood supplied only 2 percent of U.S. energy in 1972, the year before the Arab embargo sent oil prices spiraling upward. In recent years wood has been making a moderate comeback. Both residential and industrial use of fuelwood is increasing. Between 1974 and 1981, roused by higher prices for fossil fuels such as coal, oil, and natural gas, Americans increased their use of wood fuels by 45 percent, according to the Department of Energy (DOE). The DOE found the number of households using firewood as their main space-heating fuel more than doubled in a recent 2-year period. In 1980 wood furnished about 1.5 quads (1.5 quadrillion BTU's) of energy, approximately 3 percent of the Nation's total. A U.S. Congress Office of Technology Assessment report on bioenergy says the total use of wood for energy could reach 5 to 10 quads annually by 2000.

A household fuelwood consumption study conducted by the Wisconsin Department of Natural Resources (DNR) found total firewood use by Wisconsin households was 1,371,000 cords during the 1979-1980 heating season. Approximately 485,000 households (29 percent) burned wood in stoves, furnaces, or fireplaces during that period.

NEED FOR PRODUCTION STUDY

A study of Wisconsin fuelwood production in 1981 was necessary to provide estimates of fuelwood production for the fourth Wisconsin forest inventory and to determine the impact of fuelwood production on the forest resource. The 1979-1980 consumption study only provided data for household users; information on production for industrial and other users was not available. Twenty percent of the household fuel was purchased, and no information was known on the timber sources and counties of origin for this material.

Forest managers and users are now questioning the magnitude of the fuelwood harvest and the sources of the wood. How much fuelwood is harvested from forest land? Urban areas? Fence rows and windbreaks? Pastures and cropland? How much fuelwood comes from public land? Does most of the fuelwood come from growing stock? Are dead trees an important source? Are loggers major producers of fuelwood? What are the principal species cut? Where are the principal fuelwood-producing areas in Wisconsin? Are saw log and pulpwood markets threatened by fuelwood producers?

To answer these and other related questions in Wisconsin, a cooperative study was completed in 1982 by the North Central Forest Experiment Station and the Wisconsin Department of Natural Resources.

ANALYSIS OF PRODUCTION

From Roundwood

Geographic source.—Central and Southeastern Wisconsin supplied one-half of the 1.916 million cords of fuelwood harvested in 1981. No Survey Unit contributed less than 14 percent. Counties each producing more than 50,000 cords (in order of importance) were Marathon, Outagamie, Oneida, Sheboygan, Grant, Eau Claire, and Chippewa (fig. 1).

Type of producer.—Fuelwood producers are divided into two major segments—households and commercial loggers. Households dominated production in all areas of the State and produced 7 out of 8 cords overall. However, loggers harvested 1 out of 4 cords in the two Northern Units:

Survey Unit	Production		Total
	Households	Loggers	
	(Thousand cords)		
Northeastern	241	79	320
Northwestern	204	66	270
Central	411	82	493
Southwestern	355	10	365
Southeastern	465	3	468
Total	1,676	240	1,916

Species.—Red oak and elm dominated the fuelwood harvest—they comprised 52 percent of the roundwood. Leading species cut were:

Species	Volume	Percent
	(Thousand cords)	
Red oak	526	28
Elm	479	25
Hard maple	179	9
White oak	176	9
Aspen	103	5
White birch	98	5
Soft maple	85	4
Ash	69	4

No other species supplied more than 26,000 cords. Only 3 percent was softwoods; white, jack, and red pine were the major species.

Red oak was important for fuel in every Unit, especially in the Central Unit where it provided 205,000 cords. Elm was a major contributor in every Unit including 141,000 cords cut in the Southeast and 124,000 cords cut in the Southwest. More than 50,000 cords of hard maple came from each northern Unit. White oak cutting was concentrated in the Central and southern Units.

Private vs. public land.—Private land furnished 92 percent of the fuelwood cut. Public land supplied a significant quantity of fuelwood in the northern Units and a nominal amount in the southern Units:

Unit	Private	Public
	(Thousand cords)	
Northeastern	264	56
Northwestern	200	70
Central	470	23
Southwestern	362	3
Southeastern	465	3
All	1,761	155

Forest industry land (owned by firms with primary wood-using mills) provided less than 1 percent of the fuelwood from the private sector.

In the public sector the leading source of fuelwood was county and municipal land:

Public land class	Fuelwood volume	Public
	(Thousand cords)	(Percent)
County and municipal	62	40
State	40	26
National Forest	37	24
Indian	16	10
	155	100

Counties and municipalities administer the most commercial forest land in Wisconsin.

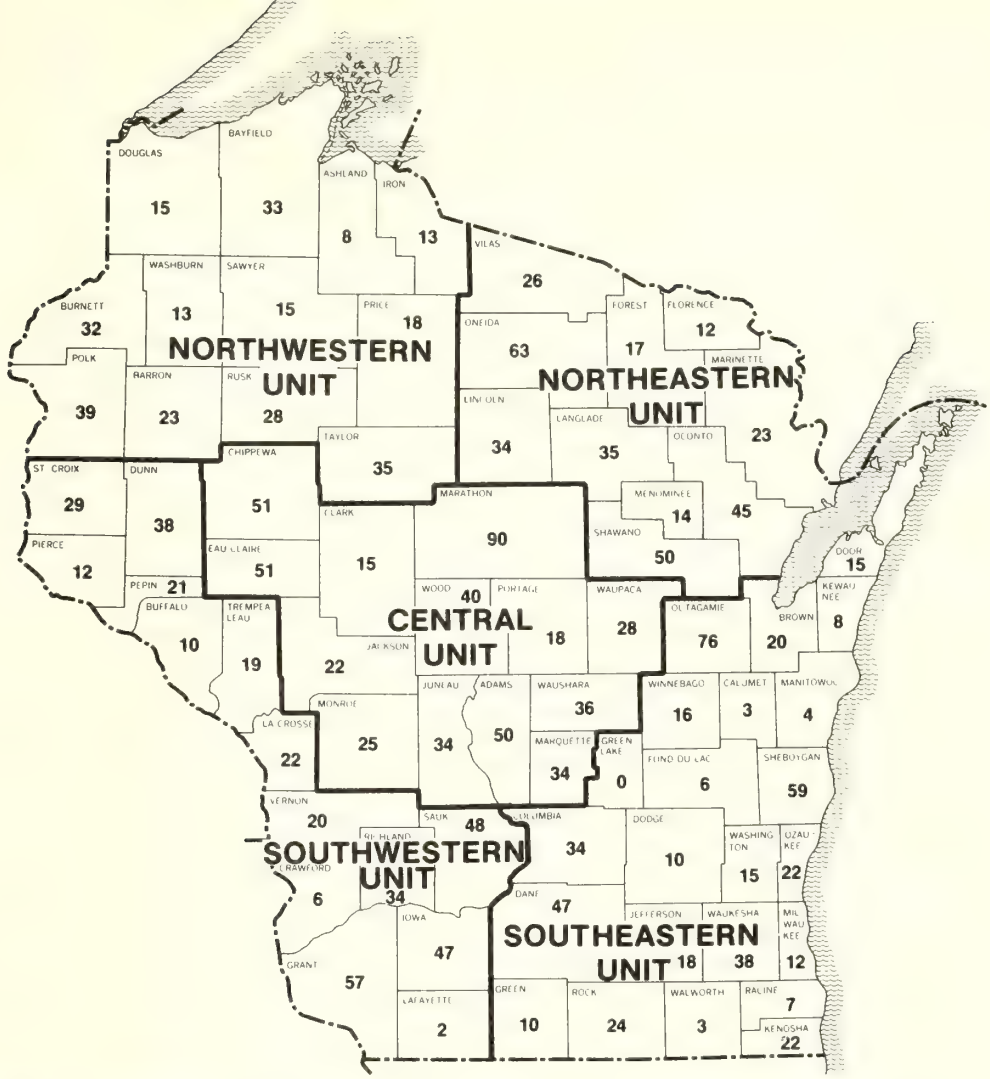

Figure 1.—*Fuelwood production by county from roundwood (in thousand standard cords), Wisconsin, 1981. Forest Survey Units shown are the geographical areas used by the Forest Inventory and Analysis Project to report periodic inventories and use of the Nation's forest resources.*

Oak and maple were the principal species cut on county and municipal land; 83 percent of the total production from this owner class came from the northern Units. More than three-fourths of the fuelwood harvested on State land was oak. The Northwestern and Central Units contributed most of the harvest from State land. Maple dominated the cut from the National Forests. Indian land in the Northeastern Unit provided most of the fuelwood from that class; elm was the primary species.

Rural woodland[1] *vs. other land.*—Seventy-eight out of every 100 cords of fuelwood came from rural woodland; the remainder came from diverse sources such as cities and villages; fence rows, windbreaks, and yards of homes in rural areas; and pasture and cropland. Rural woodland was the major source of fuelwood in all Units, especially the northern and Central Units where a higher percentage of land is forested:

Unit	Rural woodland	Other land
	(Thousand cords)	
Northeastern	302	18
Northwestern	219	51
Central	449	44
Southwestern	237	128
Southeastern	295	173
All	1,502	414

[1]*Rural woodland was assumed to be commercial forest land.*

Of the 22 cords out of 100 obtained on noncommercial forest and nonforest land areas, 9 cords came from fence rows, windbreaks, and rural yards; 7 cords came from pasture and cropland; 5 cords came from cities and villages; and 1 cord came from other areas.

Elm was the primary fuelwood species cut in cities and villages, and from fence rows, windbreaks and rural yards. Dutch elm disease control programs provide free wood in some cities. Oak was the most important species group from pasture and cropland.

Sixty-three percent of the fuelwood produced in cities and villages came from the heavily urbanized Southeastern Unit. Tree disease sanitation programs were very active in the Southeastern Unit. Nearly three-fourths of the harvest from fence rows, windbreaks, and rural yards was in the southern Units. For the pasture and cropland sector, the northwestern and the two southern Units produced the major portion.

Growing stock vs. nongrowing stock.—Growing stock (see definitions) on commercial forest land (CFL) was not a major source of fuelwood. Of the 1,916,000 cords of fuelwood cut from roundwood, an estimated 296,000 cords (15 percent) came from growing stock on CFL. Producers cut 1,206,000 cords (63 percent) from nongrowing stock on CFL:

Source	Volume	Percent of total
	(Thousand cords)	
Growing stock on CFL	296	15
Nongrowing stock on CFL		
Dead trees	889	46
Tops and limbs of growing stock trees	257	14
Cull trees and sections	58	3
Saplings	2	(2)
Nonforest and non CFL	414	22
Total	1,916	100

Nonforest and noncommercial forest land sources (such as cities, villages, pasture, cropland, fence rows, and windbreaks) supplied the other 414,000 cords (22 percent).

In general, the proportion of fuelwood harvested from growing stock on CFL declined from north to south in Wisconsin. The highest proportion cut from growing stock on CFL was in the Northwestern Unit:

Unit	Growing stock	
	Volume	Percent of Unit total
	(Thousand cords)	
Northeastern	65	20
Northwestern	64	24
Central	89	18
Southwestern	43	12
Southeastern	35	7
All	296	15

Six Northwestern Unit counties—Ashland, Barron, Bayfield, Burnett, Douglas, and Washburn—each produced more than 30 percent of their fuelwood from growing stock (fig. 2). By contrast, counties in the Milwaukee area with less growing stock volume produced less than 1 percent of their fuelwood from growing stock. Counties each producing more than 10,000 cords of fuelwood from growing stock were Bayfield, Burnett, Oneida, Shawano, Marathon, Chippewa, and Outagamie (fig. 3).

In the Central Unit, more than half of the fuelwood was cut from dead trees on CFL. Three Central Unit counties (Adams, Clark, and Marquette) each harvested 70 percent or more of their fuelwood from dead trees.

Compared to households, commercial loggers produced a much higher proportion of their fuelwood from growing stock on CFL. Loggers cut 43 percent from growing stock compared to 11 percent by households. By Survey Units, the proportion harvested from growing stock ranged from 38 to 51 percent for loggers and 7 to 15 percent for households.

From Primary Wood-using Mill Residue

Wisconsin primary wood-using mills generated 623,000 cord equivalents of wood residue in 1981. Eighty-four percent was hardwood. Forty percent of this total (250,000 cords) was used for fuel[3].

Most (85 percent) of the residue used for fuel was hardwood. Northeastern Wisconsin was the leading supplier of both softwood and hardwood:

Unit	Softwood	Hardwood
	(Thousand standard cords)	
Northeastern	21	67
Northwestern	8	44
Central	6	38
Southwestern	3	53
Southeastern	1	9
All	39	211

[2]*Less than 0.5 percent.*

[3]*Of the total residue, 38 percent was used for pulpwood, 20 percent was used for other products, and 2 percent was not used.*

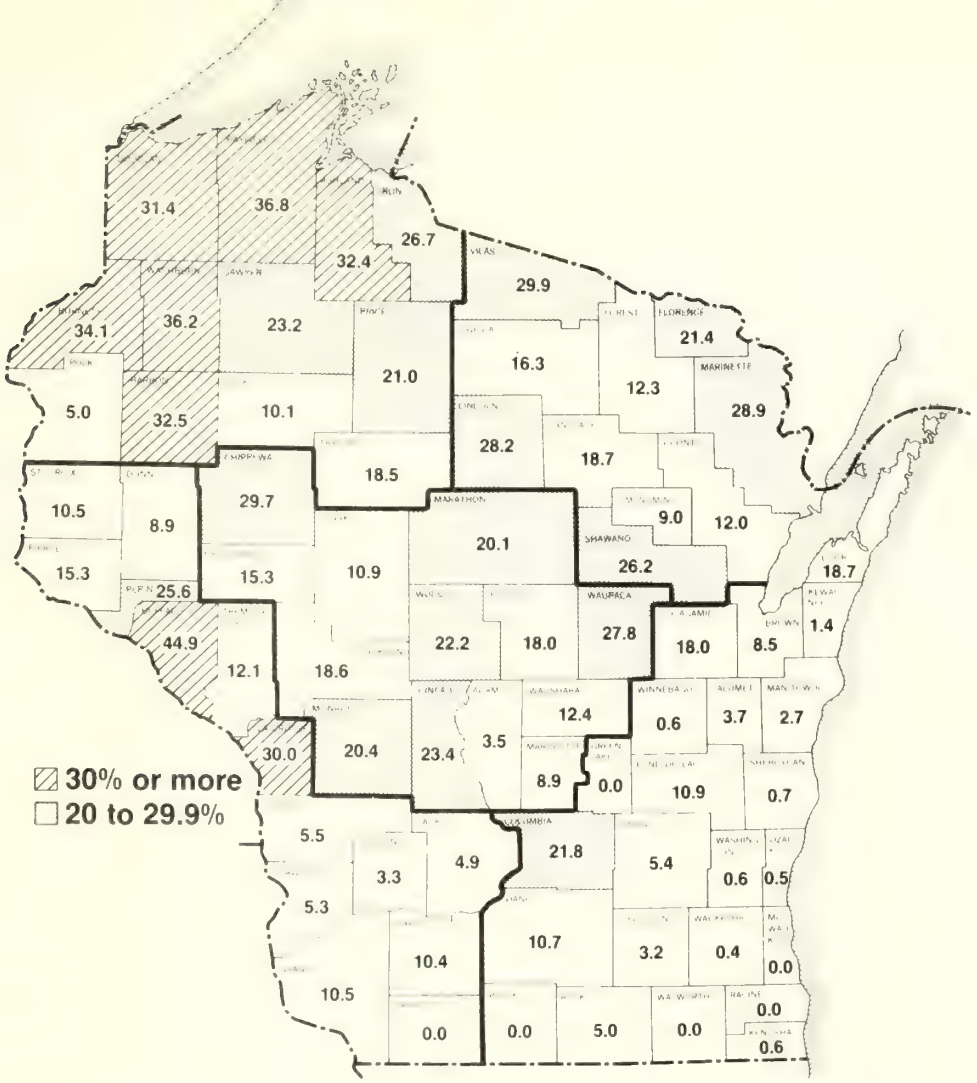

Figure 2.—*Percent of fuelwood harvest from growing stock on commercial forest land by county, Wisconsin, 1981.*

Nearly 62 percent of the residue burned was coarse (chippable) and the remainder was fines (primarily sawdust, shavings, and veneer clippings).

Two user groups, were identified—industrial and domestic. Industrial customers used about three-fifths of the residue burned for fuel; 88,000 cords were fines and 64,000 cords were coarse residue. Domestic (household) users preferred coarse residue because it is easier to handle and burns better than fines in most stoves and fireplaces. Domestic customers used 98,000 cords; only 7,000 cords were fines.

SUMMARY AND CONCLUSIONS

Total output of fuelwood during 1981 in Wisconsin from roundwood and primary wood-using mill residue was 2,166,000 cords. This volume of fuelwood contained sufficient heat value to replace approximately 217,000,000 gallons of No. 2 fuel oil[4]. Of every 100 cords produced, 88 cords were from roundwood and 12 cords were from primary mill wood residue. Hardwoods provided 96 percent of the total. Nearly half of the softwood fuel came from the Northeastern Unit:

Unit	Softwoods	Hardwoods
	(Thousand standard cords)	
Northeastern	42	367
Northwestern	14	308
Central	16	522
Southwestern	5	415
Southeastern	11	466
All	88	2,078

[4] *When comparing heat value between fuels, another factor to consider is the energy required to produce and deliver the fuels to the consumer.*

Figure 3.—*Number of cords of fuelwood harvested from growing stock on commercial forest land by county, Wisconsin, 1981.*

Hardwood fuel sources were well distributed between Units with each Unit supplying at least 15 percent.

All areas of the State participated significantly in the roundwood harvest for fuel. Households were the major producers, outproducing commercial loggers by a ratio of 7 to 1. Slightly more than one-half of the harvest was red oak and elm. Private rural woodland was the chief source of fuelwood.

Growing stock on CFL was not an important source of fuelwood—it accounted for only 15 percent of the roundwood cut or enough to supply one 500 ton per day pulpmill with wood for 1 year. No county produced more than 18,000 cords of fuelwood from growing stock on CFL. Nongrowing stock on CFL was four times as important for fuelwood as growing stock. Dead trees on CFL accounted for almost half of the harvest. More fuelwood was cut from nonforest and noncommercial forest land than from growing stock on CFL.

For a given quantity of fuelwood, loggers cut about four times as much from growing stock on CFL as did households. If loggers become a more important supplier of fuelwood, the percentage of growing stock in the mix of fuelwood will rise.

Some forest managers and wood procurement managers in Wisconsin fear that large quantities of fuelwood are being cut from growing stock that previously would have been used for pulpwood. Our study results should allay some of their concerns. Truckloads of fuelwood moving to market may appear to be identical to pulpwood from a distance, but some of this wood is from dead trees unsuitable or

undesirable for pulp and from trees on nonforest and noncommercial forest land that are not generally a forest industry supply source.

During the next 5 to 8 years, growing stock is likely to remain a minor source of Wisconsin fuelwood. Large quantities of dead trees, tops and limbs, and trees on nonforest land are available each year for fuelwood use. Follow-up fuelwood studies at 5-year intervals would be useful in determining trends in harvesting growing stock for fuel. Changes in the logger to household fuelwood production ratio will be important in determining the proportion of fuelwood cut from growing stock on CFL.

Use of dead trees and cull trees on CFL for fuel is contributing to forest productivity increases. As demand for fuelwood has increased, more of these trees have been removed for a profit as fuel or without need for subsidized incentives. Consequently, less money has been required for a given level of timber stand improvement than if fuelwood demand had remained at low levels.

STUDY METHODS

Data for this publication came from sampling Wisconsin households, loggers, and primary wood-using mills with formal questionnaires approved by the Federal Office of Management and Budget.

Roundwood Fuel

Households.—The respondent universe was all households in Wisconsin with listed telephones. Households were selected for the sample by the Wisconsin Department of Natural Resources (DNR) using systematic random sampling techniques. To save time and money, the phone numbers for sample households selected for the 1980 Wisconsin fuelwood consumption study were used where feasible. Approximately 55 percent of the sample phone numbers used in the consumption study were located in phone books used in the 1980 study. The other 45 percent of the sample was missing because some phone books had been discarded. New phone books were procured to replace the discarded books and a new sample of phone numbers was selected to replace those missing, using the same sample selection methods used in 1980.

Although part (55 percent) of the sample was originally drawn in 1980 and the other 45 percent was selected in 1982, the basic methods used were as follows. All Wisconsin phone directories were collected. All duplicate books and numbers and all out-of-State numbers were eliminated. Wisconsin was divided into 8 survey districts (fig. 4). Districts 1, 2, 3, and 7 comprise the Southeastern Survey Unit. District 5 is the Northeastern Unit, District 4 is the Northwestern Unit, District 6 is the Central Unit, and District 8 is the Southwestern Unit.

The sample size chosen in each District was sufficient to ensure a certain level of accuracy in the consumption study. The sample size was accepted for this production study because the standard error was expected to be less than ±10 percent Statewide at one standard deviation. The household sample ranged from 122 in District 3 to 728 in District 1.

After the duplciate numbers were eliminated, the number of residential phone listings was estimated in each book. Phone books were sorted by District and numbered consecutively in each District for systematically selecting the sample. Then the estimated number of residential phone listings was compiled for each District and was divided by the sample size for the District to determine the interval between sample phone numbers. For each District, a random start within the interval was drawn and identified the first sample residential number. The next sample phone number was identified by moving through the phone book by the interval between samples to the next sample; each successive sample phone number was determined by the interval between samples until all sample numbers were selected in the District.

To facilitate rapid selection of the samples, the "ruler" method was used in each phone book. Using a ruler, the number of phone entries per inch was counted for a few pages. Then the total number of entries per page was determined by multiplying the average number of listings per inch by the number of inches per column and then multiplying by the number of columns per page. Next, all empty spaces and nonresidential phone numbers on the page were counted and subtracted from the total number of entries per page to find the total number of residential phone listings per page. The number of residential phone numbers per page was found for 10-20 pages to get an average. Finally, this average was multiplied by the number of pages in the book to estimate the total number of residential listings in the book, taking care to subtract pages containing advertisements and government listings.

DNR foresters interviewed the sample households by phone using a formal questionnaire prepared by the North Central Forest Experiment Station. If a sample household cut fuelwood or collected it on the land where it was grown, interviewers asked to speak to the household member who knew the most about the quantity and kind of fuelwood cut or collected. If that person was not available, the interviewer asked when to call back for an interview with the knowledge-

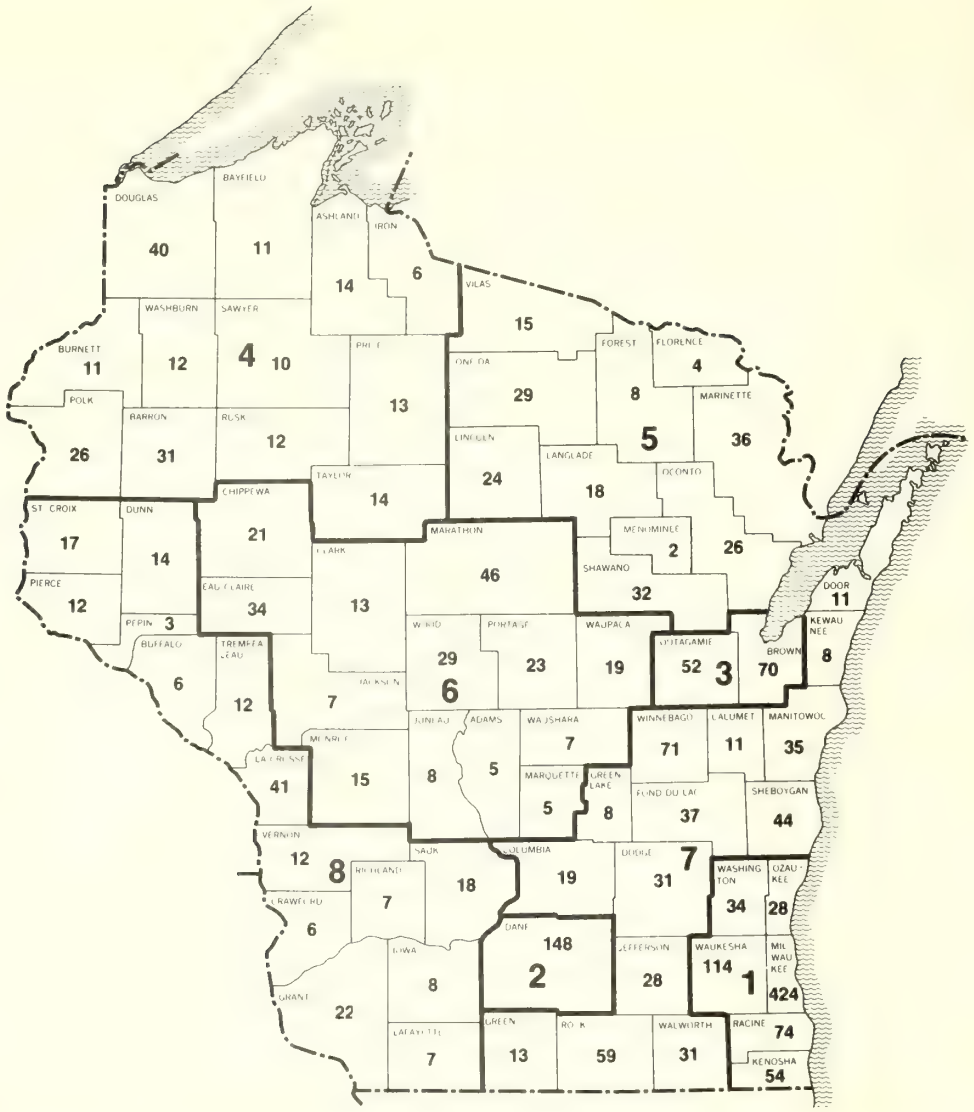

Figure 4.—*Survey districts and sample households. Small number in each county indicates the number of households sampled in the county.*

able respondent. Samples were replaced if the household could not be reached after six phone calls, if the sample was not a household, or if the household refused to answer. A replacement sample was the next residential number listed below the one being replaced.

The Station edited and compiled the data. Some respondents did not know the species cut for fuel, except in general terms such as mixed hardwoods, pine, maple, etc. Some assumptions were made to facilitate prorating the volume reported in general terms to specific species by county. The assumptions were:

General rule: Prorate on the basis of inventory volume in the county at the time of the last inventory.

Pine: If the trees are dead on rural woodland, give double weighting to jack pine, then prorate to white, red, and jack pine. Otherwise, prorate without double weighting.

Mixed softwoods: Prorate to all softwood species.

Maple: Give double weighting to hard maple and prorate to hard and soft maple.

Birch: Prorate to yellow and white birch.

Oak: Prorate to white and red oak.

Mixed hardwoods: Prorate to all hardwoods, except walnut is excluded for fuelwood cut from rural woodland.

Sampling rates were about twice as high in the Northern Units as in the others. Expansion factors

were determined for each Survey District by dividing the number of households in a District by the number of sample households in that District. These expansion factors were used to estimate the total fuelwood production by households in each county. The factors ranged from 405.9 in District 5 to 848.5 in District 3. Within a District, the sample was uniformly spread over the counties in the District. Statewide, 2,215 households were in the sample.

Commercial loggers.—A list of known active loggers was compiled for each county by the DNR. Several sources were used to locate loggers including DNR District Foresters. A total of 2,482 loggers were listed in alphabetical order by county. A 10 percent sample was selected by the Station beginning with a random start picked between 1 and 10 and adding consecutively an interval of 10 in selecting each of the other sample loggers. The sample of 248 loggers was distributed uniformly over all counties, and an expansion factor of 10 was used to estimate total fuelwood production by loggers in each county.

Using a formal questionnaire similar to that used for households, DNR foresters canvassed the loggers by phone with procedures similar to those used for households. Possible duplicate sampling of loggers was minimized by questioning all sample households producing more than 20 cords of fuelwood to determine if their name was on the commercial logger listing.

For estimating growing stock on CFL harvested for fuel, "rural woodland" (woodland outside city and village limits) was assumed to be commercial forest land (CFL). Logging utilization factors for fuelwood were used in estimating the quantity of growing stock cut for fuelwood on CFL. The Station developed these factors in Michigan during 1964-1965 by measuring trees cut for fuelwood on active harvesting operations. For fuelwood cut from live trees on CFL, 63 percent was estimated to be growing stock. For fuelwood cut or collected from logging residue on CFL, an estimated 27 percent was growing stock.

Fuel From Residue

Using a formal questionnaire, DNR foresters personally contacted all Wisconsin primary wood-using mills (those using logs and bolts) to determine the quantity of logs processed by them in 1981 and to determine how their wood and bark residue was used. Wood residue was divided into two categories—coarse wood (chippable) and fine wood (not chippable). Softwoods and hardwoods were separate categories. For each residue category, and for softwoods and hardwoods separately, the percentage of residue in 1981 was determined at each mill for six types of disposal. The percentages totaled 100 for each residue and species category. Two of the types of disposal were industrial fuelwood and domestic (household) fuel.

Conversion factors developed from past studies were used to estimate the quantity of residue generated at the primary mills in 1981 based on their logs and bolts processed. These residue quantities were then distributed by disposal category for each mill. Finally, the quantity by residue category was determined in each county.

APPENDIX
SAMPLING ERROR
Roundwood Fuel

All the reported figures are estimates based on sampling procedures that are designed to give accurate estimates of fuelwood production. A measure of reliability of these figures is given by sampling errors. This sampling error means that the chances are two out of three that the results for the sample differ by no more than the amount indicated from the results that would have been obtained if a 100 percent sample of all households and loggers had been made. Sampling error for fuelwood production was ±6.59 percent on a volume of 1,915,979 cords.

Fuel from Primary Mill Residue

All primary wood-using firms were canvassed to determine fuelwood production from their wood residue, so there is no sampling error.

DEFINITION OF TERMS

Commercial forest land.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. Areas qualifying as commercial forest land have the capability of producing in excess of 20 cubic feet per acre per year of annual growth under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future. In this paper, "woodland areas outside city or village limits (rural woodland)" were assumed to be commercial forest land.

County and municipal land.—Land owned by counties and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

Forest industry land.—Land owned by companies or individuals operating primary wood-using plants.

Growing-stock trees.—Live trees of commercial species qualifying as desirable and acceptable trees. Excludes rough cull and rotten cull trees.

Growing-stock volume.—Net volume in cubic feet of growing-stock trees 5.0 inches d.b.h. and over, from a 1-foot stump to a minimum 4.0 inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs.

Indian land.—Tribal land held in fee but administered by the Federal Government.

Logging residue.—The unused portions of trees cut or killed by logging.

National Forest Land.—Federal land that has been legally designated as National Forest or purchase units, and other land under the administration of the USDA Forest Service.

Nonforest land.—Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses. Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, power line clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as land.

Poletimber trees.—Growing-stock trees of commercial species at least 5.0 inches d.b.h., but smaller than sawtimber size.

Primary wood-using mills.—Mills receiving roundwood or chips from roundwood for processing into products.

Primary wood-using mill residue.—Wood materials (coarse and fine) and bark generated at manufacturing plants from roundwood processed into principal products. These residues include wood products (byproducts) obtained incidental to production of principal products and wood materials not utilized for some product.

Coarse mill residue.—Wood residue suitable for chipping such as slabs, edgings, and veneer cores.

Fine mill residue.—Wood residue not suitable for chipping such as sawdust and veneer clippings.

Roundwood.—Logs and bolts from harvested trees including chips from harvested trees.

Saw log portion.—That part of the bole of sawtimber trees between the stump and the saw log top.

Saw log top.—The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw log top is 7.0 inches d.o.b. for softwoods and 9.0 inches d.o.b. for hardwoods.

Sawtimber trees.—Growing-stock trees of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting Regional specifications for freedom from defect. Softwoods must be at least 9.0 inches d.b.h. Hardwoods must be at least 11.0 inches d.b.h.

Standard cord.—A pile of logs 4x4x8 feet (128 cubic feet including air space and bark). A cord of fuelwood contains 70 cubic feet of wood and 58 cubic feet of bark and air space.

State land.—Land owned by States or land leased to these governmental units for 50 years or more.

Upper stem portion.—That part of the bole of sawtimber trees above the saw log top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs.

STUDY LIMITATIONS

One minor component of total fuelwood production was not estimated—fuelwood produced from wood residue generated at secondary wood-using mills such as millwork plants, furniture plants, and office and store fixture manufacturers. This residue has no direct impact and only a nominal indirect influence on the forest resource used for fuelwood.

Households without listed telephones were not sampled. Study results may be slightly biased if the fuelwood harvest per household without listed phones is significantly different in quantity or sources from the fuelwood harvest per household with listed phones. Harvesting characteristics by these two groups was assumed to be similar, and expansion factors for estimating total fuelwood production took into account all households in Wisconsin.

Table 1.--Fuelwood production from roundwood by Unit, county, species, and source, Wisconsin, 1981

(In standard cords)

NORTHEAST UNIT

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
Florence County								
Cedar	111	0	0	0	0	0	111	0
Pine	59	0	59	0	0	0	0	0
Total softwoods	170	0	59	0	0	0	111	0
Ash	10	0	0	0	5	5	0	0
Birch	2,109	0	0	0	1,516	0	593	0
White birch	10	0	0	0	5	5	0	0
Yellow birch	94	0	0	0	38	0	56	0
Elm	4,998	0	0	0	1,307	0	3,691	0
Maple	698	0	0	0	222	5	471	0
Oak	3,487	0	177	0	902	5	2,403	0
Other hardwoods	318	0	0	0	50	20	248	0
Total hardwoods	11,724	0	177	0	4,045	40	7,462	0
All species	11,894	0	236	0	4,045	40	7,573	0
Forest County								
Balsam fir	19	0	0	0	0	0	19	0
Hemlock	19	0	0	0	0	0	19	0
Total softwoods	38	0	0	0	0	0	38	0
Ash	214	0	0	0	49	135	30	0
Aspen	403	0	8	0	6	0	389	0
Basswood	10	0	0	0	9	0	1	0
Birch	1,041	0	0	0	423	372	246	0
Yellow birch	94	0	0	0	38	0	56	0
Elm	12,678	0	8	0	458	2,142	10,070	0
Maple	2,149	0	0	0	760	707	604	78
Oak	478	0	0	0	98	0	302	78
Other hardwoods	236	0	4	0	49	50	133	0
Total hardwoods	17,303	0	20	0	1,890	3,406	11,831	156
All species	17,341	0	20	0	1,890	3,406	11,869	156

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
Langlade County								
Jack pine	141	0	0	0	141	0	0	0
Total softwoods	141	0	0	0	141	0	0	0
Ash	1,174	0	0	0	456	435	283	0
Aspen	2,737	0	0	0	1,344	0	1,393	0
Birch	528	0	0	0	136	260	132	0
Elm	18,361	0	0	0	495	4,922	12,944	0
Hickory	460	0	0	0	125	320	15	0
Maple	7,631	0	0	0	570	4,732	2,329	0
Hard maple	2,100	0	0	0	1,575	0	525	0
Oak	1,509	0	0	0	385	1,043	81	0
Red oak	25	0	0	0	0	25	0	0
Other hardwoods	412	0	0	0	41	80	291	0
Total hardwoods	34,937	0	0	0	5,127	11,817	17,993	0
All species	35,078	0	0	0	5,268	11,817	17,993	0
Lincoln County								
Pine	839	0	0	0	0	0	839	0
Jack pine	146	0	0	0	137	0	9	0
Total softwoods	985	0	0	0	137	0	848	0
Ash	470	0	0	0	83	381	6	0
Aspen	4,766	0	0	0	3,707	0	1,059	0
Birch	6,575	0	0	0	3,726	836	2,013	0
White birch	20	0	0	0	0	7	13	0
Elm	7,436	0	0	1,352	438	306	5,340	0
Hickory	120	0	0	0	24	96	0	0
Maple	8,118	0	0	0	3,861	2,431	1,826	0
Hard maple	61	0	0	0	0	22	39	0
Oak	5,109	0	0	0	222	2,348	2,539	0
Red oak	5	0	0	0	0	5	0	0
Other hardwoods	30	0	0	0	6	24	0	0
Total hardwoods	32,710	0	0	1,352	12,067	6,456	12,835	0
All species	33,695	0	0	1,352	12,204	6,456	13,683	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands			Other sources
					Standing live trees	Logging waste	Dead trees	
Marinette County								
Ash	125	0	0	0	23	17	85	0
Aspen	3,540	0	0	0	1,559	0	1,981	0
Birch	5,762	0	0	0	2,411	68	3,283	0
White birch	334	0	0	0	301	0	33	0
Elm	730	0	0	0	469	17	244	0
Maple	3,200	0	0	0	2,726	68	406	0
Hard maple	136	0	0	0	122	0	14	0
Soft maple	475	0	0	0	427	0	48	0
Oak	8,974	0	0	0	2,561	0	6,413	0
Other hardwoods	18	0	0	0	16	0	2	0
All species	23,294	0	0	0	10,615	170	12,509	0
Menominee County								
Ash	60	0	0	0	60	0	0	0
Birch	300	0	0	0	300	0	0	0
Elm	8,560	0	0	0	36	0	8,524	0
Hickory	96	0	0	0	96	0	0	0
Maple	1,218	0	0	0	0	0	1,218	0
Hard maple	204	0	0	0	204	0	0	0
Soft maple	800	0	0	0	800	0	0	0
Oak	2,939	0	0	0	504	0	2,435	0
All species	14,177	0	0	0	2,000	0	12,177	0
Oconto County								
Ash	2,000	0	0	0	3	6	1,991	0
Aspen	4,043	279	0	836	2,133	0	795	0
Basswood	1,015	0	0	0	102	0	913	0
Beech	1,947	584	0	0	545	0	818	0
Birch	13,086	0	1,967	0	1,807	3,050	6,262	0
Elm	9,714	1,156	203	836	1,270	22	6,227	0
Maple	10,385	0	0	0	443	1,021	8,921	0
Oak	3,155	0	0	0	547	8	2,600	0
All species	45,345	2,019	2,170	1,672	6,850	4,107	28,527	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood					
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
				Oneida County				
Hemlock	5,519	0	0	0	0	0	5,519	0
Pine	5,519	0	0	0	0	0	5,519	0
Mixed softwoods	2,521	0	0	0	0	2,521	0	0
Total softwoods	13,559	0	0	0	0	2,521	11,038	0
Ash	105	0	0	0	87	10	8	0
Aspen	2,502	0	878	0	1,624	0	0	0
Basswood	5,519	0	0	0	0	0	5,519	0
Birch	16,259	0	548	0	1,125	8,167	6,419	0
White birch	25	0	0	0	18	3	4	0
Elm	345	0	0	0	279	10	56	0
Maple	15,970	0	591	0	3,567	3,433	8,379	0
Hard maple	195	0	0	0	162	14	19	0
Oak	8,166	0	0	0	2,068	2,436	3,662	0
Mixed hardwoods	761	0	0	0	0	761	0	0
Total hardwoods	49,847	0	2,017	0	8,930	14,834	24,066	0
All species	63,406	0	2,017	0	8,930	17,355	35,104	0
				Shawano County				
Ash	3,752	0	10	0	1,217	2,470	55	0
Aspen	1,218	0	0	0	0	0	1,218	0
Basswood	609	0	0	0	609	0	0	0
Birch	3,363	0	162	0	507	1,795	899	0
Elm	10,693	0	150	0	1,070	5,236	4,237	0
Hickory	2,625	0	20	0	582	1,993	30	0
Maple	11,538	0	10	0	1,553	8,968	1,007	0
Hard maple	1,053	0	0	0	316	684	53	0
Oak	13,346	0	0	0	1,511	7,369	4,466	0
Red oak	1,051	0	0	0	315	683	53	0
Other hardwoods	510	0	10	0	100	400	0	0
All Species	49,758	0	362	0	7,780	29,598	12,018	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands			Other sources
					Standing live trees	Logging waste	Dead trees	
Vilas County								
Pine	230	0	27	0	0	0	203	0
Red pine	5,357	0	5,357	0	0	0	0	0
Mixed softwoods	211	0	0	0	0	158	53	0
Total softwoods	5,798	0	5,384	0	0	158	256	0
Ash	357	0	0	0	321	0	36	0
Aspen	45	0	0	0	43	0	2	0
Birch	4,054	0	257	0	1,190	0	2,607	0
Yellow birch	10	0	0	0	0	5	5	0
Elm	693	0	0	0	624	0	69	0
Maple	3,810	0	0	0	3,075	438	297	0
Hard maple	4,975	0	0	0	4,481	0	494	0
Soft maple	693	0	0	0	624	0	69	0
Oak	5,072	0	2,760	0	1,327	155	830	0
Other hardwoods	357	0	0	0	321	0	36	0
Total hardwoods	20,066	0	3,017	0	12,006	598	4,445	0
All species	25,864	0	8,401	0	12,006	756	4,701	0
All Counties								
Cedar	111	0	0	0	0	0	111	0
Balsam fir	19	0	0	0	0	0	19	0
Hemlock	5,538	0	0	0	0	0	5,538	0
Pine	6,647	0	86	0	0	0	6,561	0
Jack pine	287	0	0	0	278	0	9	0
Red pine	5,357	0	5,357	0	0	0	0	0
Mixed softwoods	2,732	0	0	0	0	2,679	53	0
Total softwoods	20,691	0	5,443	0	278	2,679	12,291	0
Ash	8,267	0	10	0	2,304	3,459	2,494	0
Aspen	19,254	279	886	836	10,416	0	6,837	0
Basswood	7,153	0	0	0	720	0	6,433	0
Beech	1,947	584	0	0	545	0	818	0
Birch	53,077	0	2,934	0	13,141	14,548	22,454	0
White birch	389	0	0	0	324	15	50	0
Yellow birch	198	0	0	0	76	5	117	0
Elm	74,208	1,156	361	2,188	6,446	12,655	51,402	0
Hickory	3,301	0	20	0	827	2,409	45	0
Maple	64,717	0	601	0	16,777	21,803	25,458	78
Hard maple	8,724	0	0	0	6,860	720	1,144	0
Soft maple	1,968	0	0	0	1,851	0	117	0
Oak	52,235	0	2,937	0	10,125	13,364	25,731	78
Red oak	1,081	0	0	0	315	713	53	0
Mixed hardwoods	761	0	0	0	0	761	0	0
Other hardwoods	1,881	0	14	0	583	574	710	0
Total hardwoods	299,161	2,019	7,763	3,024	71,310	71,026	143,863	156
All species	319,852	2,019	13,206	3,024	71,588	73,705	156,154	156

(Table 1 continued on next page)

(Table 1 continued)

NORTHWEST UNIT

Species group[1/]	All sources	Source of fuelwood					
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
Ashland County								
Cedar	462	0	0	0	0	0	462	0
Hemlock	462	0	0	0	0	0	462	0
Spruce	476	0	0	0	0	0	476	0
Total softwoods	1,400	0	0	0	0	0	1,400	0
Ash	278	0	0	0	238	18	22	0
Aspen	23	0	0	0	8	3	12	0
Birch	161	0	0	0	16	129	16	0
White birch	31	0	0	0	11	5	15	0
Elm	278	0	0	0	126	130	22	0
Maple	3,524	0	0	0	537	2,491	496	0
Hard maple	1,849	0	0	0	1,812	0	37	0
Total hardwoods	6,144	0	0	0	2,748	2,776	620	0
All species	7,544	0	0	0	2,748	2,776	2,020	0
Barron County								
Ash	1,832	0	0	0	1,749	0	83	0
Aspen	2,305	0	0	0	1,310	0	995	0
Basswood	741	0	0	0	0	0	741	0
Birch	467	0	0	0	234	0	233	0
White birch	262	0	0	0	0	0	262	0
Elm	3,198	0	0	261	248	436	2,253	0
Hickory	12	0	0	0	3	9	0	0
Maple	727	0	0	174	553	0	0	0
Oak	10,812	0	0	1,307	6,697	441	2,367	0
Red oak	2,493	0	0	0	0	1,017	1,476	0
Other hardwoods	295	0	0	0	292	0	3	0
All species	23,144	0	0	1,742	11,086	1,903	8,413	0

(Table 1 continued on next page

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands			Other sources
					Standing live trees	Logging waste	Dead trees	
Bayfield County								
Cedar	109	0	0	0	11	0	98	0
Balsam fir	218	0	0	0	22	0	196	0
Total softwoods	327	0	0	0	33	0	294	0
Ash	133	0	0	0	118	2	13	0
Aspen	1,138	44	0	218	270	508	98	0
Birch	4,105	44	0	0	1,049	1,330	1,682	0
White birch	600	0	0	0	594	0	6	0
Elm	4,270	0	0	4,145	112	0	13	0
Maple	10,772	393	0	0	6,049	3,995	335	0
Hard maple	1,809	0	0	0	1,809	0	0	0
Oak	7,506	393	0	0	3,336	3,647	130	0
Red oak	1,200	0	0	0	1,188	0	12	0
Mixed hardwoods	650	0	0	0	65	585	0	0
Total hardwoods	32,183	874	0	4,363	14,590	10,067	2,289	0
All species	32,510	874	0	4,363	14,623	10,067	2,583	0
Burnett County								
Pine	164	0	0	0	0	0	164	0
Jack pine	888	0	685	0	112	0	91	0
Total softwoods	1,052	0	685	0	112	0	255	0
Aspen	531	20	102	0	224	0	185	0
Birch	2,058	5	0	0	875	207	971	0
Elm	4,206	0	426	0	783	0	2,997	0
Maple	600	0	0	0	533	19	48	0
Oak	23,102	74	509	0	12,671	3,948	5,900	0
Total hardwoods	30,497	99	1,037	0	15,086	4,174	10,101	0
All species	31,549	99	1,722	0	15,198	4,174	10,356	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
Douglas County								
Pine	70	0	0	0	70	0	0	0
Spruce	17	0	0	17	0	0	0	0
Total softwoods	87	0	0	17	70	0	0	0
Ash	2,879	0	0	2,618	261	0	0	0
Aspen	2,914	0	0	1,309	321	0	1,284	0
Basswood	807	0	0	0	0	0	807	0
Birch	1,249	0	0	0	954	250	45	0
White birch	402	0	0	262	28	0	112	0
Maple	1,615	0	0	157	1,156	250	52	0
Oak	4,021	0	0	0	3,351	500	170	0
Red oak	783	0	0	0	775	0	8	0
Total hardwoods	14,670	0	0	4,346	6,846	1,000	2,478	0
All species	14,757	0	0	4,363	6,916	1,000	2,478	0
Iron County								
Ash	55	0	0	0	55	0	0	0
Basswood	4,871	0	0	0	0	0	4,871	0
Birch	907	0	0	0	781	105	21	0
Yellow birch	110	0	0	0	110	0	0	0
Elm	1,953	0	0	0	959	293	701	0
Maple	5,315	0	0	0	2,547	2,122	646	0
Oak	200	0	0	0	150	20	30	0
All species	13,411	0	0	0	4,602	2,540	6,269	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands			Other sources
					Standing live trees	Logging waste	Dead trees	
Polk County								
Balsam fir	1,309	0	0	0	0	0	1,309	0
Total softwoods	1,309	0	0	0	0	0	1,309	0
Aspen	632	0	0	0	76	229	327	0
Birch	617	0	0	0	23	106	147	341
Elm	25,585	0	8,238	8,165	0	473	7,235	1,474
Maple	175	0	0	0	0	12	49	114
Hard maple	61	0	0	0	15	46	0	0
Oak	10,233	0	1,994	1,309	1,739	2,063	2,787	341
Total hardwoods	37,303	0	10,232	9,474	1,853	2,929	10,545	2,270
All species	38,612	0	10,232	9,474	1,853	2,929	11,854	2,270
Price County								
Ash	90	0	0	0	23	8	59	0
Aspen	74	0	0	0	3	3	68	0
Basswood	9	0	0	0	3	3	3	0
Birch	989	0	0	0	141	20	828	0
Elm	8,896	0	0	0	3,126	12	5,758	0
Maple	7,726	0	0	0	2,616	44	5,066	0
Oak	10	0	0	0	0	10	0	0
Other hardwoods	44	0	0	0	0	0	44	0
All species	17,838	0	0	0	5,912	100	11,826	0
Rusk County								
Balsam fir	873	0	0	873	0	0	0	0
Pine	349	0	0	0	0	0	349	0
Total softwoods	1,222	0	0	873	0	0	349	0
Ash	738	0	0	0	156	0	582	0
Aspen	419	0	0	0	0	0	419	0
Birch	3,595	84	0	2,181	11	690	629	0
Elm	4,653	0	0	0	0	1,380	3,273	0
Hickory	1,453	0	0	0	0	1,380	73	0
Maple	3,140	0	0	2,618	83	0	439	0
Soft maple	2,781	0	0	2,781	0	0	0	0
Oak	9,662	196	0	0	151	5,815	3,500	0
Total hardwoods	26,441	280	0	7,580	401	9,265	8,915	0
All species	27,663	280	0	8,453	401	9,265	9,264	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands			Other sources
					Standing live trees	Logging waste	Dead trees	
Sawyer County								
Ash	534	0	0	70	411	32	21	0
Aspen	2,094	0	0	0	0	0	2,094	0
Birch	910	0	0	664	233	0	13	0
Elm	1,567	0	665	70	271	96	465	0
Maple	2,640	0	0	917	989	192	542	0
Hard maple	2,740	0	0	0	2,703	0	37	0
Oak	4,355	0	0	3,307	734	0	314	0
Other hardwoods	50	0	0	35	15	0	0	0
All species	14,890	0	665	5,063	5,356	320	3,486	0
Taylor County								
Pine	100	0	0	0	0	0	100	0
Total softwoods	100	0	0	0	0	0	100	0
Ash	750	0	0	0	650	0	100	0
Aspen	615	0	0	0	0	0	615	0
Birch	1,477	0	0	0	1,115	0	362	0
Elm	5,591	0	0	0	1,613	0	3,978	0
Hickory	750	0	0	0	750	0	0	0
Maple	20,131	0	0	0	4,498	0	15,633	0
Oak	1,222	0	0	0	686	0	536	0
Mixed hardwoods	3,923	0	0	0	785	0	3,138	0
Total hardwoods	34,459	0	0	0	10,097	0	24,362	0
All species	34,559	0	0	0	10,097	0	24,462	0
Washburn County								
Pine	262	0	0	0	0	131	131	0
Total softwoods	262	0	0	0	0	131	131	0
Ash	3	0	0	0	0	0	3	0
Aspen	72	0	0	0	36	0	36	0
Birch	1,808	0	0	0	1,507	33	268	0
Elm	436	0	0	436	0	0	0	0
Maple	2,171	0	0	436	1,690	0	45	0
Oak	7,790	0	0	0	4,225	491	3,074	0
Mixed hardwoods	873	0	0	873	0	0	0	0
Total hardwoods	13,153	0	0	1,745	7,458	524	3,426	0
All species	13,415	0	0	1,745	7,458	655	3,557	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands			Other sources
					Standing live trees	Logging waste	Dead trees	
				All counties				
Cedar	571	0	0	0	11	0	560	0
Balsam fir	2,400	0	0	873	22	0	1,505	0
Hemlock	462	0	0	0	0	0	462	0
Pine	945	0	0	0	70	131	744	0
Jack pine	888	0	685	0	112	0	91	0
Spruce	493	0	0	17	0	0	476	0
Total softwoods	5,759	0	685	890	215	131	3,838	0
Ash	7,292	0	0	2,688	3,661	60	883	0
Aspen	10,817	64	102	1,527	2,248	743	6,133	0
Basswood	6,428	0	0	0	3	3	6,422	0
Birch	18,343	133	0	2,845	6,939	2,870	5,215	341
White birch	1,295	0	0	262	633	5	395	0
Yellow birch	110	0	0	0	110	0	0	0
Elm	60,633	0	9,329	13,077	7,238	2,820	26,695	1,474
Hickory	2,215	0	0	0	753	1,389	73	0
Maple	58,536	393	0	4,302	21,251	9,125	23,351	114
Hard maple	6,459	0	0	0	6,339	46	74	0
Soft maple	2,781	0	0	2,781	0	0	0	0
Oak	78,913	663	2,503	5,923	33,740	16,935	18,808	341
Red oak	4,476	0	0	0	1,963	1,017	1,496	0
Mixed hardwoods	5,446	0	0	873	850	585	3,138	0
Other hardwoods	389	0	0	35	307	0	47	0
Total hardwoods	264,133	1,253	11,934	34,313	86,035	35,598	92,730	2,270
All species	269,892	1,253	12,619	35,203	86,250	35,729	96,568	2,270

(Table 1 continued on next page)

(Table 1 continued)

CENTRAL UNIT

Species group[1/]	All sources	Source of fuelwood: Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
Adams County								
Pine	958	0	0	0	0	0	958	0
Jack pine	7	0	0	0	0	0	7	0
Total softwoods	965	0	0	0	0	0	965	0
Aspen	962	0	0	0	47	0	915	0
Birch	329	0	0	0	13	19	297	0
White birch	567	0	0	0	28	0	539	0
Elm	97	0	0	0	0	19	78	0
Maple	394	0	0	0	32	0	362	0
Oak	37,063	1,000	23	0	2,537	255	33,248	0
Mixed hardwoods	9,268	0	0	0	0	0	9,268	0
Total hardwoods	48,680	1,000	23	0	2,657	293	44,707	0
All species	49,645	1,000	23	0	2,657	293	45,672	0
Chippewa County								
Ash	3,621	0	0	0	1,366	263	1,992	0
Aspen	3,834	84	770	0	1,024	420	1,536	0
Birch	3,814	0	0	0	1,577	620	1,617	0
White birch	35	0	0	0	7	0	28	0
Elm	6,444	0	0	0	1,740	3,108	1,596	0
Hickory	48	0	0	0	12	36	0	0
Maple	6,947	0	770	0	2,393	302	3,482	0
Soft maple	1,049	0	0	0	105	787	157	0
Oak	21,414	0	770	0	9,390	7,055	4,199	0
Red oak	671	671	0	0	0	0	0	0
Other hardwoods	3,274	84	770	0	968	0	1,452	0
All species	51,151	839	3,080	0	18,582	12,591	16,059	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands			Other sources
					Standing live trees	Logging waste	Dead trees	
Clark County								
Pine	5	0	0	0	0	0	5	0
Total softwoods	5	0	0	0	0	0	5	0
Ash	2,151	0	0	0	260	0	1,891	0
Aspen	11	0	0	0	0	0	11	0
Basswood	50	0	0	0	50	0	0	0
White birch	23	0	0	0	23	0	0	0
Elm	7,480	605	0	7	420	0	6,448	0
Maple	2,609	121	0	0	410	0	2,078	0
Hard maple	54	0	0	54	0	0	0	0
Soft maple	52	0	0	0	52	0	0	0
Oak	2,590	484	0	0	1,375	0	731	0
Red oak	6	0	0	6	0	0	0	0
Total hardwoods	15,026	1,210	0	67	2,590	0	11,159	0
All species	15,031	1,210	0	67	2,590	0	11,164	0
Eau Claire County								
Ash	500	0	0	0	500	0	0	0
Aspen	21	0	0	0	21	0	0	0
Birch	3,189	84	0	0	1,004	0	2,101	0
Elm	1,383	403	0	0	375	0	605	0
Maple	713	81	0	0	511	0	121	0
Oak	45,684	518	0	0	5,281	10,948	28,937	0
All species	51,490	1,086	0	0	7,692	10,948	31,764	0
Jackson County								
Aspen	24	0	0	0	24	0	0	0
Birch	10	0	0	0	10	0	0	0
White birch	68	0	0	0	68	0	0	0
Elm	11,191	0	11,191	0	0	0	0	0
Maple	2,143	519	0	0	65	0	1,559	0
Soft maple	158	0	0	0	158	0	0	0
Oak	8,603	519	0	0	6,240	0	1,844	0
All species	22,197	1,038	11,191	0	6,565	0	3,403	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
Juneau County								
Balsam fir	582	0	0	0	291	0	291	0
Pine	1,039	0	0	0	0	0	1,039	0
Jack pine	1,746	0	0	0	873	0	873	0
Total softwoods	3,367	0	0	0	1,164	0	2,203	0
Ash	500	0	0	0	375	0	125	0
Aspen	756	0	76	0	136	0	544	0
Birch	500	0	0	0	375	0	125	0
Elm	2,449	0	76	611	802	0	960	0
Maple	1,664	0	0	0	957	0	707	0
Oak	21,573	0	605	611	8,749	19	11,589	0
Mixed hardwoods	3,116	0	0	0	0	0	3,116	0
Total hardwoods	30,558	0	757	1,222	11,394	19	17,166	0
All species	33,925	0	757	1,222	12,558	19	19,369	0
Marathon County								
Pine	1,827	0	0	0	1,146	0	681	0
Total softwoods	1,827	0	0	0	1,146	0	681	0
Ash	12,279	0	0	168	7,028	865	4,218	0
Aspen	3,277	0	0	0	315	0	2,962	0
Birch	9,200	0	0	0	53	1,415	7,732	0
Elm	33,414	0	0	8,487	5,234	3,015	16,678	0
Hickory	400	0	0	0	80	320	0	0
Maple	14,143	0	0	504	3,479	6,777	3,383	0
Hard maple	13	0	0	0	0	0	13	0
Oak	12,567	0	0	1,344	3,058	6,234	1,931	0
Mixed hardwoods	1,743	0	0	0	0	0	1,743	0
Other hardwoods	654	0	0	0	20	80	554	0
Total hardwoods	87,690	0	0	10,503	19,267	18,706	39,214	0
All species	89,517	0	0	10,503	20,413	18,706	39,895	0
Marquette County								
Pine	652	0	0	0	0	0	652	0
Total softwoods	652	0	0	0	0	0	652	0
Ash	473	0	0	0	95	0	378	0
Aspen	710	0	0	0	142	0	568	0
Oak	31,849	0	4,201	0	4,494	0	23,154	0
Total hardwoods	33,032	0	4,201	0	4,731	0	24,100	0
All species	33,684	0	4,201	0	4,731	0	24,752	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
Monroe County								
Pine	1	0	0	0	0	0	1	0
Total softwoods	1	0	0	0	0	0	1	0
Ash	500	0	0	0	375	0	125	0
Aspen	3,402	0	0	0	0	0	3,402	0
Birch	963	0	0	0	375	0	588	0
Elm	2,895	0	0	0	974	0	1,921	0
Maple	1,761	0	0	0	375	0	1,386	0
Oak	15,746	0	0	0	6,032	0	9,714	0
Total hardwoods	25,267	0	0	0	8,131	0	17,136	0
All species	25,268	0	0	0	8,131	0	17,137	0
Portage County								
Cedar	111	0	0	0	0	0	111	0
Total softwoods	111	0	0	0	0	0	111	0
Ash	759	0	0	0	0	759	0	0
Aspen	4,537	0	0	0	0	4,537	0	0
Birch	1,179	0	34	0	0	765	380	0
Elm	1,172	0	84	0	0	0	1,088	0
Maple	2,040	0	0	0	0	2,040	0	0
Oak	7,809	0	34	0	700	2,040	5,035	0
Other hardwoods	168	0	17	0	0	0	151	0
Total hardwoods	17,664	0	169	0	700	10,141	6,654	0
All species	17,775	0	169	0	700	10,141	6,765	0
Waupaca County								
Pine	50	0	50	0	0	0	0	0
Total softwoods	50	0	50	0	0	0	0	0
Ash	2,133	6	0	0	356	1,690	81	0
Birch	1,838	0	0	0	143	1,660	35	0
Elm	2,986	8	0	0	561	2,249	168	0
Hickory	1,605	0	0	0	382	1,193	30	0
Maple	7,100	0	0	0	768	6,218	114	0
Hard maple	1,053	0	0	0	316	684	53	0
Oak	9,708	11	248	0	647	5,598	3,204	0
Red oak	1,051	0	0	0	315	683	53	0
Other hardwoods	449	0	199	0	50	200	0	0
Total hardwoods	27,923	25	447	0	3,538	20,175	3,738	0
All species	27,973	25	497	0	3,538	20,175	3,738	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands			Other sources
					Standing live trees	Logging waste	Dead trees	
Waushara County								
Pine	2,659	2,659	0	0	0	0	0	0
Total softwoods	2,659	2,659	0	0	0	0	0	0
Aspen	128	0	77	0	10	0	41	0
Birch	705	0	0	0	0	0	705	0
Elm	7,877	0	0	0	122	0	7,755	0
Maple	41	0	0	0	31	0	10	0
Oak	23,496	0	77	3,942	6,821	0	12,656	0
Other hardwoods	597	0	358	0	48	0	191	0
Total hardwoods	32,844	0	512	3,942	7,032	0	21,358	0
All species	35,503	2,659	512	3,942	7,032	0	21,358	0
Wood County								
Pine	75	0	0	0	0	0	75	0
Total softwoods	75	0	0	0	0	0	75	0
Aspen	15,042	0	0	0	10,072	0	4,970	0
Birch	2,354	0	0	0	422	0	1,932	0
Elm	149	0	0	0	0	0	149	0
Maple	6,563	0	0	0	562	0	6,001	0
Oak	15,931	0	0	0	3,054	17	12,860	0
Total hardwoods	40,039	0	0	0	14,110	17	25,912	0
All species	40,114	0	0	0	14,110	17	25,987	0
All Counties								
Cedar	111	0	0	0	0	0	111	0
Balsam fir	582	0	0	0	291	0	291	0
Pine	7,266	2,659	50	0	1,146	0	3,411	0
Jack pine	1,753	0	0	0	873	0	880	0
Total softwoods	9,712	2,659	50	0	2,310	0	4,693	0
Ash	22,916	6	0	168	10,355	3,577	8,810	0
Aspen	32,704	84	923	0	11,791	4,957	14,949	0
Basswood	50	0	0	0	50	0	0	0
Birch	24,081	84	34	0	3,972	4,479	15,512	0
White birch	693	0	0	0	126	0	567	0
Elm	77,537	1,016	11,351	9,105	10,228	8,391	37,446	0
Hickory	2,053	0	0	0	474	1,549	30	0
Maple	46,118	721	770	504	9,583	15,337	19,203	0
Hard maple	1,120	0	0	54	316	684	66	0
Soft maple	1,259	0	0	0	315	787	157	0
Oak	254,033	2,532	5,958	5,897	58,378	32,166	149,102	0
Red oak	1,728	671	0	6	315	683	53	0
Mixed hardwoods	14,127	0	0	0	0	0	14,127	0
Other hardwoods	5,142	84	1,344	0	1,086	280	2,348	0
Total hardwoods	483,561	5,198	20,380	15,734	106,989	72,890	262,370	0
All species	493,273	7,857	20,430	15,734	109,299	72,890	267,063	0

(Table 1 continued on next page)

(Table 1 continued)

SOUTHWEST UNIT

Species group[1/]	All sources	Source of fuelwood: Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
Buffalo County								
Aspen	607	0	0	0	577	30	0	0
Basswood	405	0	0	0	385	20	0	0
Elm	105	0	0	105	0	0	0	0
Maple	2,266	0	0	0	122	2,144	0	0
Oak	6,673	0	0	105	3,976	2,592	0	0
All species	10,056	0	0	210	5,060	4,786	0	0
Crawford County								
Ash	2	0	0	0	0	2	0	0
Basswood	2	0	0	0	0	2	0	0
Elm	3,188	0	1,594	0	526	0	1,068	0
Hickory	106	0	53	0	17	0	36	0
Maple	1,415	0	0	0	0	2	1,413	0
Oak	1,600	0	71	0	23	45	1,461	0
Other hardwoods	106	0	53	0	17	0	36	0
All species	6,419	0	1,771	0	583	51	4,014	0
Dunn County								
Balsam fir	135	135	0	0	0	0	0	0
Total softwoods	135	135	0	0	0	0	0	0
Ash	7,536	7,286	0	0	250	0	0	0
Aspen	4,655	0	405	0	0	0	4,250	0
Elm	13,104	12,143	557	50	76	38	240	0
Maple	1,155	0	405	0	750	0	0	0
Oak	10,679	4,857	607	0	4,304	152	759	0
Red oak	950	0	0	950	0	0	0	0
Other hardwoods	405	0	405	0	0	0	0	0
Total hardwoods	38,484	24,286	2,379	1,000	5,380	190	5,249	0
All species	38,619	24,421	2,379	1,000	5,380	190	5,249	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands			Other sources
					Standing live trees	Logging waste	Dead trees	
Grant County								
Pine	2,429	0	2,429	0	0	0	0	0
Total softwoods	2,429	0	2,429	0	0	0	0	0
Aspen	4,999	0	1,457	3,542	0	0	0	0
Elm	14,362	0	619	6,780	405	2,436	4,122	0
Hickory	1,581	0	1,581	0	0	0	0	0
Hard maple	81	0	81	0	0	0	0	0
Oak	24,969	0	3,643	10,321	7,690	623	2,692	0
Walnut	80	0	80	0	0	0	0	0
Other hardwoods	8,483	0	8,460	0	0	23	0	0
Total hardwoods	54,555	0	15,921	20,643	8,095	3,082	6,814	0
All species	56,984	0	18,350	20,643	8,095	3,082	6,814	0
Iowa County								
Ash	815	0	0	0	0	0	815	0
Birch	972	0	0	486	0	0	486	0
Elm	10,785	0	367	1,096	428	7,737	1,157	0
Oak	29,581	0	689	10,319	685	3,798	14,090	0
Walnut	1,409	0	29	29	34	1,283	34	0
Other hardwoods	3,228	0	484	484	565	1,130	565	0
All species	46,790	0	1,569	12,414	1,712	13,948	17,147	0
La Crosse County								
Birch	487	0	0	0	122	0	122	243
Elm	3,281	0	728	0	304	61	1,945	243
Hickory	244	0	0	0	61	0	61	122
Maple	9,066	0	728	0	8,277	61	0	0
Oak	4,170	0	728	0	425	61	2,470	486
Other hardwoods	4,615	0	1,457	0	1,032	121	668	1,337
All species	21,863	0	3,641	0	10,221	304	5,266	2,431
LaFayette County								
Ash	210	0	0	0	0	0	210	0
Elm	518	203	0	0	0	0	315	0
Oak	203	203	0	0	0	0	0	0
Other hardwoods	810	0	810	0	0	0	0	0
All species	1,741	406	810	0	0	0	525	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood: Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
Pepin County								
Elm	7,285	0	0	0	0	0	7,285	0
Oak	810	0	0	0	0	0	810	0
Mixed hardwoods	12,952	0	0	0	5,181	7,771	0	0
All species	21,047	0	0	0	5,181	7,771	8,095	0
Pierce County								
Ash	70	0	0	0	70	0	0	0
Basswood	70	0	0	0	70	0	0	0
Cottonwood	607	0	0	607	0	0	0	0
Elm	4,511	0	0	404	384	0	3,723	0
Hickory	405	0	0	81	65	0	259	0
Maple	809	0	0	162	129	0	518	0
Oak	4,847	0	0	162	2,143	0	2,542	0
Other hardwoods	607	0	0	607	0	0	0	0
All species	11,926	0	0	2,023	2,861	0	7,042	0
Richland County								
Aspen	1,069	0	1,069	0	0	0	0	0
Birch	1,158	0	1,158	0	0	0	0	0
Elm	21,331	0	5,804	0	0	2,024	13,503	0
Maple	2,459	0	1,069	0	19	0	1,371	0
Oak	7,824	0	1,158	0	19	2,029	4,618	0
All species	33,841	0	10,258	0	38	4,053	19,492	0
St. Croix County								
Pine	405	0	0	0	0	0	405	0
Total softwoods	405	0	0	0	0	0	405	0
Aspen	4,371	607	2,550	0	607	0	607	0
Birch	304	0	0	0	152	0	152	0
Elm	12,913	0	6,031	0	2,591	0	4,291	0
Maple	405	0	0	0	0	0	405	0
Oak	9,027	0	1,032	0	1,407	0	6,588	0
Other hardwoods	1,315	0	1,315	0	0	0	0	0
Total hardwoods	28,335	607	10,928	0	4,757	0	12,043	0
All species	28,740	607	10,928	0	4,757	0	12,448	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood: Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
Sauk County								
Birch	971	0	0	0	194	0	777	0
Elm	13,357	0	546	0	486	519	11,806	0
Maple	121	0	6	0	0	6	109	0
Oak	16,536	0	1,698	0	1,166	35	13,637	0
Mixed hardwoods	16,190	0	0	0	1,619	0	14,571	0
Other hardwoods	859	0	18	0	97	17	727	0
All species	48,034	0	2,268	0	3,562	577	41,627	0
Trempealeau County								
Aspen	405	0	0	0	0	385	20	0
Elm	4,048	0	0	4,048	0	0	0	0
Oak	14,392	0	0	0	0	7,936	6,456	0
All species	18,845	0	0	4,048	0	8,321	6,476	0
Vernon County								
Elm	12,795	0	0	1,617	0	250	4,857	6,071
Oak	7,299	0	0	0	0	3,867	3,432	0
Other hardwoods	304	0	0	0	0	0	304	0
All species	20,398	0	0	1,617	0	4,117	8,593	6,071
All Counties								
Balsam fir	135	135	0	0	0	0	0	0
Pine	2,834	0	2,429	0	0	0	405	0
Total softwoods	2,969	135	2,429	0	0	0	405	0
Ash	8,633	7,286	0	0	320	2	1,025	0
Aspen	16,106	607	5,481	3,542	1,184	415	4,877	0
Basswood	477	0	0	0	455	22	0	0
Birch	3,892	0	1,158	486	468	0	1,537	243
Cottonwood	607	0	0	607	0	0	0	0
Elm	12,583	12,346	16,246	14,100	5,200	13,065	54,312	6,314
Hickory	2,336	0	1,634	81	143	0	356	122
Maple	17,696	0	2,208	162	9,297	2,213	3,816	0
Hard maple	81	0	81	0	0	0	0	0
Oak	138,610	5,060	9,626	20,907	21,838	21,138	59,555	486
Red oak	950	0	0	950	0	0	0	0
Walnut	1,489	0	109	29	34	1,283	34	0
Mixed hardwoods	29,142	0	0	0	6,800	7,771	14,571	0
Other hardwoods	20,732	0	13,002	1,091	1,711	1,291	2,300	1,337
Total hardwoods	362,334	25,299	49,545	41,955	47,450	47,200	142,383	8,502
All species	365,303	25,434	51,974	41,955	47,450	47,200	142,788	8,502

(Table 1 continued on next page)

(Table 1 continued)

SOUTHEAST UNIT

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands			Other sources
					Standing live trees	Logging waste	Dead trees	
Brown County								
Tamarack	510	0	0	0	255	0	255	0
Total softwoods	510	0	0	0	255	0	255	0
Ash	3,861	2,715	573	573	0	0	0	0
Aspen	712	263	0	364	0	0	85	0
Birch	1,810	0	0	0	764	0	1,046	0
Elm	10,726	93	2,673	3,716	1,528	0	2,716	0
Maple	585	509	0	0	19	0	19	38
Oak	1,146	0	573	573	0	0	0	0
Other hardwoods	434	0	0	0	109	0	109	216
Total hardwoods	19,274	3,580	3,819	5,226	2,420	0	3,975	254
All species	19,784	3,580	3,819	5,226	2,675	0	4,230	254
Calumet County								
Ash	226	0	0	0	113	0	113	0
Basswood	311	0	0	0	57	0	254	0
Elm	1,050	0	0	0	0	0	1,050	0
Maple	114	0	0	0	57	0	57	0
Oak	1,774	0	0	0	0	0	1,774	0
All species	3,475	0	0	0	227	0	3,248	0
Columbia County								
Pine	52	0	52	0	0	0	0	0
Total softwoods	52	0	52	0	0	0	0	0
Aspen	315	0	0	0	79	236	0	0
Basswood	1,896	0	0	0	4	1,608	284	0
Cottonwood	4	0	0	0	4	0	0	0
Elm	946	0	0	0	0	0	946	0
Maple	105	0	0	0	21	0	84	0
Oak	29,991	0	155	0	2,477	18,733	8,626	0
Other hardwoods	374	0	0	0	79	236	59	0
Total hardwoods	33,631	0	155	0	2,664	20,813	9,999	0
All species	33,683	0	207	0	2,664	20,813	9,999	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
Dane County								
Ash	852	0	0	37	0	0	815	0
Aspen	734	0	0	0	367	0	367	0
Basswood	2,445	0	0	0	2,445	0	0	0
Elm	3,152	1,019	869	408	25	0	831	0
Hickory	282	0	0	37	25	0	220	0
Maple	6,461	652	326	4,112	0	0	1,371	0
Oak	31,605	815	427	4,779	2,136	5,623	17,825	0
Other hardwoods	1,657	54	503	0	489	244	367	0
All species	47,188	2,540	2,125	9,373	5,487	5,867	21,796	0
Dodge County								
Pine	37	0	37	0	0	0	0	0
Total softwoods	37	0	37	0	0	0	0	0
Aspen	79	0	0	0	20	59	0	0
Basswood	131	131	0	0	0	0	0	0
Cottonwood	500	0	250	250	0	0	0	0
Elm	5,179	630	824	540	0	0	2,555	630
Maple	84	0	42	42	0	0	0	0
Oak	3,287	79	1,426	0	355	1,064	284	79
Mixed hardwoods	823	0	416	407	0	0	0	0
Other hardwoods	370	211	0	0	20	59	0	80
Total hardwoods	10,453	1,051	2,958	1,239	395	1,182	2,839	789
All species	10,490	1,051	2,995	1,239	395	1,182	2,839	789
Door County								
Cedar	619	0	0	0	25	0	594	0
Balsam fir	291	0	0	0	0	0	291	0
Total softwoods	910	0	0	0	25	0	885	0
Ash	736	0	0	0	243	243	250	0
Basswood	783	520	263	0	0	0	0	0
Beech	881	0	0	0	300	273	308	0
Birch	7,694	0	0	0	2,430	2,274	2,990	0
Elm	1,198	134	0	0	0	0	1,064	0
Maple	1,800	0	0	0	243	243	1,314	0
Oak	1,131	0	0	0	0	0	1,131	0
Other hardwoods	134	134	0	0	0	0	0	0
Total hardwoods	14,357	788	263	0	3,216	3,033	7,057	0
All species	15,267	788	263	0	3,241	3,033	7,942	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood					
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
				Fond du Lac County				
Aspen	257	40	99	0	59	0	59	0
Birch	336	0	89	0	68	0	179	0
Elm	731	158	99	0	237	0	237	0
Hickory	158	40	0	0	59	0	59	0
Maple	946	40	709	0	130	0	67	0
Oak	1,460	79	188	0	364	0	829	0
Other hardwoods	2,426	1,223	986	0	148	0	69	0
All species	6,314	1,580	2,170	0	1,065	0	1,499	0
				Green County				
Cottonwood	789	0	0	0	0	0	789	0
Elm	6,080	1,459	367	631	0	0	3,623	0
Maple	1,051	0	0	210	0	0	841	0
Oak	1,051	0	0	210	0	0	841	0
Walnut	163	0	41	0	0	0	122	0
Other hardwoods	789	0	0	0	0	0	789	0
All species	9,923	1,459	408	1,051	0	0	7,005	0
				Jefferson County				
Ash	1,064	0	1,064	0	0	0	0	0
Aspen	520	0	260	0	156	0	104	0
Birch	91	68	23	0	0	0	0	0
Elm	2,294	986	1,048	0	156	0	104	0
Hickory	495	140	47	197	83	0	28	0
Maple	2,029	1,059	970	0	0	0	0	0
Oak	2,481	281	94	1,774	249	0	83	0
Other hardwoods	8,779	0	8,400	0	244	0	135	0
All species	17,753	2,534	11,906	1,971	888	0	454	0
				Kenosha County				
Ash	100	30	70	0	0	0	0	0
Elm	1,795	1,702	93	0	0	0	0	0
Maple	6,373	1,588	70	0	21	0	4,694	0
Oak	13,751	2,593	2,094	3,988	63	277	4,736	0
All species	22,019	5,913	2,327	3,988	84	277	9,430	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood: Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
Kewaunee County								
Birch	394	0	20	0	0	0	374	0
Elm	7,293	0	4,110	0	0	0	3,183	0
Maple	100	0	0	0	100	0	0	0
Oak	297	0	10	0	100	0	187	0
All species	8,084	0	4,140	0	200	0	3,744	0
Manitowoc County								
Aspen	213	0	0	0	0	0	213	0
Elm	1,705	0	0	0	0	0	1,705	0
Maple	288	0	0	0	75	0	213	0
Oak	338	263	0	0	75	0	0	0
Other hardwoods	1,183	0	1,183	0	0	0	0	0
All species	3,727	263	1,183	0	150	0	2,131	0
Milwaukee County								
Pine	277	277	0	0	0	0	0	0
Mixed softwoods	935	935	0	0	0	0	0	0
Total softwoods	1,212	1,212	0	0	0	0	0	0
Beech	47	0	0	0	0	0	47	0
Birch	221	221	0	0	0	0	0	0
Elm	4,798	4,798	0	0	0	0	0	0
Maple	1,656	1,446	0	0	0	0	210	0
Oak	210	0	0	0	0	0	210	0
Mixed hardwoods	2,804	2,804	0	0	0	0	0	0
Other hardwoods	1,210	1,210	0	0	0	0	0	0
Total hardwoods	10,946	10,479	0	0	0	0	467	0
All species	12,158	11,691	0	0	0	0	467	0
Outagamie County								
Pine	26	0	0	0	13	0	13	0
White pine	6,512	6,512	0	0	0	0	0	0
Total softwoods	6,538	6,512	0	0	13	0	13	0
Ash	6,789	0	0	0	4,871	621	1,297	0
Aspen	5,091	0	0	0	4,836	0	255	0
Basswood	3,182	0	0	0	0	0	3,182	0
Birch	1,069	724	0	0	133	44	168	0
Elm	25,812	212	3,394	1,697	1,331	972	18,206	0
Hickory	80	0	0	0	16	64	0	0
Maple	9,532	530	0	0	4,900	1,898	2,204	0
Oak	890	0	0	0	64	204	622	0
Mixed hardwoods	12,728	0	0	0	3,777	0	8,951	0
Other hardwoods	3,945	3,819	0	0	4	16	106	0
Total hardwoods	69,118	5,285	3,394	1,697	19,932	3,819	34,991	0
All species	75,656	11,797	3,394	1,697	19,945	3,819	35,004	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood: Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
Ozaukee County								
Pine	299	0	0	0	0	0	299	0
Jack pine	138	0	138	0	0	0	0	0
Mixed softwoods	312	312	0	0	0	0	0	0
Total softwoods	749	312	138	0	0	0	299	0
Ash	11	0	0	0	0	11	0	0
Aspen	83	0	83	0	0	0	0	0
Birch	1,662	0	0	0	0	0	1,662	0
Elm	922	270	353	0	0	0	299	0
Maple	4,279	125	0	4,154	0	0	0	0
Soft maple	352	0	0	0	0	352	0	0
Oak	2,895	125	2,704	0	0	0	66	0
White oak	7	0	0	0	0	7	0	0
Mixed hardwoods	8,819	935	0	0	0	0	7,884	0
Other hardwoods	2,046	104	1,942	0	0	0	0	0
Total hardwoods	21,076	1,559	5,082	4,154	0	370	9,911	0
All species	21,825	1,871	5,220	4,154	0	370	10,210	0
Racine County								
Aspen	722	0	99	623	0	0	0	0
Birch	66	0	66	0	0	0	0	0
Hickory	1,662	0	0	1,662	0	0	0	0
Maple	166	166	0	0	0	0	0	0
Oak	3,531	0	0	3,531	0	0	0	0
Mixed hardwoods	831	831	0	0	0	0	0	0
Other hardwoods	416	0	416	0	0	0	0	0
All species	7,394	997	581	5,816	0	0	0	0
Rock County								
Ash	394	0	0	0	0	0	394	0
Elm	2,410	456	0	509	315	126	1,004	0
Hickory	276	0	0	138	0	0	138	0
Maple	1,755	0	887	276	79	32	481	0
Soft maple	336	168	0	168	0	0	0	0
Oak	16,247	982	0	1,166	1,182	473	12,444	0
Other hardwoods	2,123	825	0	963	0	0	335	0
All species	23,541	2,431	887	3,220	1,576	631	14,796	0
Sheboygan County								
Ash	1,272	0	0	0	18	71	1,183	0
Aspen	591	0	0	0	0	0	591	0
Elm	41,508	0	1,065	0	0	142	40,301	0
Hickory	89	0	0	0	18	71	0	0
Maple	2,360	0	0	0	217	568	1,575	0
Oak	10,610	0	329	0	75	16	10,190	0
Other hardwoods	2,187	0	1,399	0	0	0	788	0
All species	58,617	0	2,793	0	328	868	54,628	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood: Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands: Standing live trees	Rural woodlands: Logging waste	Rural woodlands: Dead trees	Other sources
Walworth County								
Aspen	66	0	66	0	0	0	0	0
Basswood	13	13	0	0	0	0	0	0
Elm	118	118	0	0	0	0	0	0
Hickory	53	0	0	0	0	0	53	0
Maple	118	118	0	0	0	0	0	0
Oak	2,077	13	1,577	0	0	0	487	0
Other hardwoods	197	0	197	0	0	0	0	0
All species	2,642	262	1,840	0	0	0	540	0
Washington County								
Pine	291	0	0	0	0	0	291	0
Total softwoods	291	0	0	0	0	0	291	0
Ash	881	881	0	0	0	0	0	0
Birch	197	0	20	0	0	0	177	0
Cottonwood	500	0	250	250	0	0	0	0
Elm	5,737	0	1,934	540	35	35	3,193	0
Maple	1,174	1,090	42	42	0	0	0	0
Oak	3,608	0	329	0	65	65	3,149	0
Other hardwoods	2,447	1,321	513	0	0	0	613	0
Total hardwoods	14,544	3,292	3,088	832	100	100	7,132	0
All species	14,835	3,292	3,088	832	100	100	7,423	0
Waukesha County								
Ash	263	0	0	0	0	0	263	0
Aspen	3,379	0	2,181	0	0	0	1,198	0
Birch	807	605	202	0	0	0	0	0
Elm	6,813	3,199	3,003	0	0	0	611	0
Hickory	2,698	1,262	1,365	0	60	0	11	0
Maple	1,808	1,348	288	0	74	0	72	26
Oak	12,662	4,393	6,942	0	74	0	1,227	26
Mixed hardwoods	1,662	0	0	0	0	0	1,662	0
Other hardwoods	7,616	0	4,362	1,246	0	0	2,008	0
All species	37,708	10,807	18,343	1,246	208	0	7,052	52
Winnebago County								
Aspen	298	0	179	0	24	0	95	0
Birch	666	0	0	0	0	0	666	0
Elm	5,330	0	0	0	0	0	5,330	0
Oak	2,560	0	179	0	24	0	2,357	0
Other hardwoods	6,722	0	835	0	112	0	5,775	0
All species	15,576	0	1,193	0	160	0	14,223	0

(Table 1 continued on next page)

(Table 1 continued)

Species group[1/]	All sources	Source of fuelwood						
		Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands			Other sources
					Standing live trees	Logging waste	Dead trees	
		All counties						
Cedar	619	0	0	0	25	0	594	0
Balsam fir	291	0	0	0	0	0	291	0
Pine	982	277	89	0	13	0	603	0
Jack pine	138	0	138	0	0	0	0	0
White pine	6,512	6,512	0	0	0	0	0	0
Tamarack	510	0	0	0	255	0	255	0
Mixed softwoods	1,247	1,247	0	0	0	0	0	0
Total softwoods	10,299	8,036	227	0	293	0	1,743	0
Ash	16,449	3,626	1,707	610	5,245	946	4,315	0
Aspen	13,060	303	2,967	987	5,541	295	2,967	0
Basswood	8,761	664	263	0	2,506	1,608	3,720	0
Beech	928	0	0	0	300	273	355	0
Birch	15,013	1,618	420	0	3,395	2,318	7,262	0
Cottonwood	1,793	0	500	500	4	0	789	0
Elm	135,597	15,234	19,832	8,041	3,627	1,275	86,958	630
Hickory	5,793	1,442	1,412	2,034	261	135	509	0
Maple	42,784	8,671	3,334	8,836	5,936	2,741	13,202	64
Soft maple	688	168	0	168	0	352	0	0
Oak	143,602	9,623	17,027	16,021	7,303	26,455	67,068	105
White oak	7	0	0	0	0	7	0	0
Walnut	163	0	41	0	0	0	122	0
Mixed hardwoods	27,667	4,570	416	407	3,777	0	18,497	0
Other hardwoods	45,055	8,901	20,736	2,209	1,205	555	11,153	296
Total hardwoods	457,360	54,820	68,655	39,813	39,100	36,960	216,917	1,095
All species	467,659	62,856	68,882	39,813	39,393	36,960	218,660	1,095

(Table 1 continued on next page)

(Table 1 continued)

ALL UNITS

Species group[1/]	Source of fuelwood							
	All sources	Cities and villages	Windbreaks fencerows and rural yards	Pasture and cropland	Rural woodlands			Other sources
					Standing live trees	Logging waste	Dead trees	
	All Counties							
Cedar	1,412	0	0	0	36	0	1,376	0
Balsam fir	3,427	135	0	873	313	0	2,106	0
Hemlock	6,000	0	0	0	0	0	6,000	0
Pine	18,674	2,936	2,654	0	1,229	131	11,724	0
Jack pine	3,066	0	823	0	1,263	0	980	0
Red pine	5,357	0	5,357	0	0	0	0	0
White pine	6,512	6,512	0	0	0	0	0	0
Spruce	493	0	0	17	0	0	476	0
Tamarack	510	0	0	0	255	0	255	0
Mixed softwoods	3,979	1,247	0	0	0	2,679	53	0
Total softwoods	49,430	10,830	8,834	890	3,096	2,810	22,970	0
Ash	63,557	10,918	1,717	3,466	21,885	8,044	17,527	0
Aspen	91,941	1,337	10,359	6,892	31,180	6,410	35,763	0
Basswood	22,869	664	263	0	3,734	1,633	16,575	0
Beech	2,875	584	0	0	845	273	1,173	0
Birch	114,406	1,835	4,546	3,331	27,915	24,215	51,980	584
White birch	2,377	0	0	262	1,083	20	1,012	0
Yellow birch	308	0	0	0	186	5	117	0
Cottonwood	2,400	0	500	1,107	4	0	789	0
Elm	469,558	29,752	57,119	46,511	32,739	38,206	256,813	8,418
Hickory	15,698	1,442	3,066	2,115	2,458	5,482	1,013	122
Maple	229,851	9,785	6,913	13,804	62,844	51,219	85,030	256
Hard maple	16,384	0	81	54	13,515	1,450	1,284	0
Soft maple	6,696	168	0	2,949	2,166	1,139	274	0
Oak	667,393	17,878	38,051	48,748	131,384	110,058	320,264	1,010
Red oak	8,235	671	0	956	2,593	2,413	1,602	0
White oak	7	0	0	0	0	7	0	0
Walnut	1,652	0	150	29	34	1,283	156	0
Mixed hardwoods	77,143	4,570	416	1,280	11,427	9,117	50,333	0
Other hardwoods	73,199	8,985	35,096	3,335	4,892	2,700	16,558	1,633
Total hardwoods	1,866,549	88,589	158,277	134,839	350,884	263,674	858,263	12,023
All species	1,915,979	99,419	167,111	135,729	353,980	266,484	881,233	12,023

[1/] As reported by fuelwood producers before prorating to individual species.

Table 2.--Fuelwood production from roundwood by Unit, county, species, and ownership, Wisconsin, 1981

(In standard cords)

All UNITS

Species 1/	All ownerships	Federal		Indian	State	County and municipal	Forest industry	Other private
		National forest	Other federal					
Cedar	1,412	0	0	0	0	0	0	1,412
Balsam fir	3,427	0	0	0	0	0	0	3,427
Hemlock	6,000	0	0	0	0	0	0	6,000
Pine	18,676	0	0	0	741	123	0	17,812
Jack pine	3,065	0	0	0	0	0	0	3,065
Red pine	5,357	0	0	0	0	0	0	5,357
White pine	6,512	0	0	0	0	0	0	6,512
Spruce	493	0	0	0	0	0	0	493
Tamarack	509	0	0	0	0	0	0	509
Mixed softwoods	3,978	2,710	0	0	21	0	0	1,247
Total softwoods	49,429	2,710	0	0	762	123	0	45,834
Ash	63,559	1,355	0	669	553	607	458	59,917
Aspen	91,942	55	0	0	24	1,011	0	90,852
Basswood	22,869	0	0	609	0	3	0	22,257
Beech	2,876	0	0	0	0	0	0	2,876
Birch	114,391	2,140	0	300	1,463	7,372	1,681	101,435
White birch	2,377	30	0	0	0	942	0	1,405
Yellow birch	308	198	0	0	0	55	0	55
Cottonwood	2,398	0	0	0	0	0	0	2,398
Elm	469,548	6,881	0	8,560	793	4,113	759	448,442
Hickory	15,694	0	0	96	0	30	726	14,842
Maple	229,840	9,819	0	1,369	4,224	19,000	2,046	193,382
Hard maple	16,384	9,489	0	204	0	102	1,264	5,325
Soft maple	6,695	693	0	800	0	566	0	4,636
Oak	667,375	2,490	0	3,539	30,647	23,774	5,545	601,380
Red oak	8,233	0	0	0	0	2,013	1,260	4,960
White oak	7	0	0	0	0	0	0	7
Walnut	1,653	0	0	0	0	0	0	1,653
Mixed hardwoods	77,143	0	0	0	1,558	2,049	0	73,536
Other hardwoods	73,194	523	0	0	0	128	50	72,493
Total hardwoods	1,866,486	33,673	0	16,146	39,262	61,765	13,789	1,701,851
All species	1,915,915	36,383	0	16,146	40,024	61,888	13,789	1,747,685

(Table 2 continued on next page)

(Table 2 continued)

NORTHEAST UNIT

Species 1/	All ownerships	Federal		Indian	State	County and municipal	Forest industry	Other private
		National forest	Other federal					
Cedar	111	0	0	0	0	0	0	111
Balsam fir	19	0	0	0	0	0	0	19
Hemlock	5,538	0	0	0	0	0	0	5,538
Pine	6,647	0	0	0	203	0	0	6,444
Jack pine	287	0	0	0	0	0	0	287
Red pine	5,357	0	0	0	0	0	0	5,357
Mixed softwoods	2,731	2,710	0	0	21	0	0	0
Total softwoods	20,690	2,710	0	0	224	0	0	17,756
Ash	8,267	357	0	669	0	284	248	6,709
Aspen	19,255	32	0	0	0	279	0	18,944
Basswood	7,153	0	0	609	0	0	0	6,544
Beech	1,948	0	0	0	0	0	0	1,948
Birch	53,074	1,640	0	300	290	4,151	147	46,546
White birch	390	0	0	0	0	251	0	139
Yellow birch	198	198	0	0	0	0	0	0
Elm	74,204	5,693	0	8,560	0	1,177	641	58,133
Hickory	3,301	0	0	96	0	0	363	2,842
Maple	64,717	2,126	0	1,331	2,754	6,454	257	51,795
Hard maple	8,724	4,900	0	204	0	102	632	2,886
Soft maple	1,968	693	0	800	0	356	0	119
Oak	52,235	151	0	3,389	544	3,107	91	44,953
Red oak	1,080	0	0	0	0	30	630	420
Mixed hardwoods	761	0	0	0	0	761	0	0
Other hardwoods	1,882	523	0	0	0	14	50	1,295
Total hardwoods	299,157	16,313	0	15,958	3,588	16,966	3,059	243,273
All species	319,847	19,023	0	15,958	3,812	16,966	3,059	261,029

(Table 2 continued)

(Table 2 continued)

NORTHWEST UNIT

Species 1/	All ownerships	Federal		Indian	State	County and municipal	Forest industry	Other private
		National forest	Other federal					
Cedar	571	0	0	0	0	0	0	571
Balsam fir	2,400	0	0	0	0	0	0	2,400
Hemlock	462	0	0	0	0	0	0	462
Pine	946	0	0	0	18	123	0	805
Jack pine	888	0	0	0	0	0	0	888
Spruce	493	0	0	0	0	0	0	493
Total softwoods	5,760	0	0	0	18	123	0	5,619
Ash	7,296	998	0	0	53	282	0	5,963
Aspen	10,817	23	0	0	0	519	0	10,275
Basswood	6,429	0	0	0	0	3	0	6,426
Birch	18,338	500	0	0	650	3,186	1,500	12,502
White birch	1,294	30	0	0	0	600	0	664
Yellow birch	110	0	0	0	0	55	0	55
Elm	60,635	1,188	0	0	84	981	0	58,382
Hickory	2,215	0	0	0	0	6	0	2,209
Maple	58,535	7,693	0	38	878	12,375	1,755	35,796
Hard maple	6,459	4,589	0	0	0	0	0	1,870
Soft maple	2,781	0	0	0	0	0	0	2,781
Oak	78,910	2,339	0	150	15,910	14,089	4,545	41,877
Red oak	4,476	0	0	0	0	1,983	0	2,493
Mixed hardwoods	5,446	0	0	0	0	457	0	4,989
Other hardwoods	389	0	0	0	0	15	0	374
Total hardwoods	264,130	17,36`	0	188	17,575	34,551	7,800	186,656
All species	269,890	17,360	0	188	17,593	34,674	7,800	192,275

(Table 2 continued on next page)

(Table 2 continued)

CENTRAL UNIT

Species 1/	All ownerships	Federal		Indian	State	County and municipal	Forest industry	Other private
		National forest	Other federal					
Cedar	111	0	0	0	0	0	0	111
Balsam fir	582	0	0	0	0	0	0	582
Pine	7,267	0	0	0	520	0	0	6,747
Jack pine	1,752	0	0	0	0	0	0	1,752
Total softwoods	9,712	0	0	0	520	0	0	9,192
Ash	22,916	0	0	0	500	41	210	22,165
Aspen	32,704	0	0	0	24	21	0	32,659
Basswood	50	0	0	0	0	0	0	50
Birch	24,080	0	0	0	523	35	34	23,488
White birch	693	0	0	0	0	91	0	602
Elm	77,532	0	0	0	506	130	118	76,778
Hickory	2,053	0	0	0	0	24	363	1,666
Maple	46,115	0	0	0	566	46	34	45,469
Hard maple	1,120	0	0	0	0	0	632	488
Soft maple	1,259	0	0	0	0	210	0	1,049
Oak	254,032	0	0	0	13,334	5,284	909	234,505
Red oak	1,727	0	0	0	0	0	630	1,097
Mixed hardwoods	14,127	0	0	0	1,558	0	0	12,569
Other hardwoods	5,142	0	0	0	0	0	0	5,142
Total hardwoods	483,550	0	0	0	17,011	5,882	2,930	457,727
All species	493,262	0	0	0	17,531	5,882	2,930	466,919

(Table 2 continued)

(Table 2 continued)

SOUTHWEST UNIT

Species 1/	All ownerships	Federal		Indian	State	County and municipal	Forest industry	Other private
		National forest	Other federal					
Balsam fir	135	0	0	0	0	0	0	135
Pine	2,834	0	0	0	0	0	0	2,834
Total softwoods	2,969	0	0	0	0	0	0	2,969
Ash	8,633	0	0	0	0	0	0	8,633
Aspen	16,106	0	0	0	0	0	0	16,106
Basswood	477	0	0	0	0	0	0	477
Birch	3,890	0	0	0	0	0	0	3,890
Cottonwood	607	0	0	0	0	0	0	607
Elm	121,582	0	0	0	203	1,190	0	120,189
Hickory	2,334	0	0	0	0	0	0	2,334
Maple	17,695	0	0	0	0	0	0	17,695
Hard maple	81	0	0	0	0	0	0	81
Oak	138,606	0	0	0	833	793	0	136,980
Red oak	950	0	0	0	0	0	0	950
Walnut	1,490	0	0	0	0	0	0	1,490
Mixed hardwoods	29,142	0	0	0	0	0	0	29,142
Other hardwoods	20,732	0	0	0	0	0	0	20,732
Total hardwoods	362,325	0	0	0	1,036	1,983	0	359,306
All species	365,294	0	0	0	1,036	1,983	0	362,275

(Table 2 continued on next page)

(Table 2 continued)

SOUTHEAST UNIT

Species 1/	All ownerships	Federal		Indian	State	County and municipal	Forest industry	Other private
		National forest	Other federal					
Cedar	619	0	0	0	0	0	0	619
Balsam fir	291	0	0	0	0	0	0	291
Pine	982	0	0	0	0	0	0	982
Jack pine	138	0	0	0	0	0	0	138
White pine	6,512	0	0	0	0	0	0	6,512
Tamarack	509	0	0	0	0	0	0	509
Mixed softwoods	1,247	0	0	0	0	0	0	1,247
Total softwoods	10,298	0	0	0	0	0	0	10,298
Ash	16,447	0	0	0	0	0	0	16,447
Aspen	13,060	0	0	0	0	192	0	12,868
Basswood	8,760	0	0	0	0	0	0	8,760
Beech	928	0	0	0	0	0	0	928
Birch	15,009	0	0	0	0	0	0	15,009
Cottonwood	1,791	0	0	0	0	0	0	1,791
Elm	135,595	0	0	0	0	635	0	134,960
Hickory	5,791	0	0	0	0	0	0	5,791
Maple	42,778	0	0	0	26	125	0	42,627
Soft maple	687	0	0	0	0	0	0	687
Oak	143,592	0	0	0	26	501	0	143,065
White oak	7	0	0	0	0	0	0	7
Walnut	163	0	0	0	0	0	0	163
Mixed hardwoods	27,667	0	0	0	0	831	0	26,836
Other hardwoods	45,049	0	0	0	0	99	0	44,950
Total hardwoods	457,324	0	0	0	52	2,383	0	454,889
All species	467,622	0	0	0	52	2,383	0	465,187

1/ As reported by fuelwood producers before prorating to individual species.

Table 3.--Fuelwood production from roundwood by species group, Unit and county in Wisconsin, 1981

(In standard cords)

Unit and county	Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar	Basswood	Beech	White birch
NORTHEAST UNIT														
Florence	111	0	0	15	25	19	0	0	10	0	0	0	0	822
Forest	0	19	19	0	0	0	0	0	214	403	0	10	0	640
Langlade	0	0	0	141	0	0	0	0	1,174	2,737	0	0	0	349
Lincoln	0	0	0	454	327	204	0	0	470	4,766	0	0	0	5,483
Marinette	0	0	0	0	0	0	0	0	125	3,540	0	0	0	5,746
Menominee	0	0	0	0	0	0	0	0	60	0	0	0	0	76
Oconto	0	0	0	0	0	0	0	0	2,000	4,043	0	1,015	1,947	11,227
Oneida	134	659	5,812	2,847	2,014	1,698	324	71	131	2,813	0	5,535	0	14,994
Shawano	0	0	0	0	0	0	0	0	3,752	1,218	0	609	0	2,193
Vilas	9	6	27	136	5,455	111	39	15	357	45	0	0	0	3,309
Unit total	254	684	5,858	3,593	7,821	2,032	363	86	8,293	19,565	0	7,169	1,947	44,839
NORTHWEST UNIT														
Ashland	462	0	462	0	0	0	476	0	278	23	0	0	0	145
Barron	0	0	0	0	0	0	0	0	1,832	2,305	0	741	0	623
Bayfield	109	218	0	0	0	0	0	0	173	1,352	1	49	0	3,997
Burnett	0	0	0	1,026	14	12	0	0	224	307	0	0	0	1,806
Douglas	0	0	0	47	11	12	17	0	2,879	2,914	0	807	0	1,449
Iron	0	0	0	0	0	0	0	0	55	0	0	4871	0	675
Polk	0	1,309	0	0	0	0	0	0	0	632	0	0	0	525
Price	0	0	0	0	0	0	0	0	90	74	0	9	0	713
Rusk	0	873	0	139	62	148	0	0	738	419	0	0	0	2,818
Sawyer	0	0	0	0	0	0	0	0	534	2,094	0	0	0	714
Taylor	0	0	0	36	24	40	0	0	1,123	1,621	5	383	0	1,412
Washburn	0	0	0	184	34	44	0	0	59	421	2	54	0	1,624
Unit total	571	2,400	462	1,432	145	256	493	0	7,985	12,162	8	6,914	0	16,501
CENTRAL UNIT														
Adams	0	0	0	763	75	127	0	0	316	3,222	0	231	0	1,286
Chippewa	0	0	0	0	0	0	0	0	3,621	3,834	0	0	0	2,990
Clark	0	0	0	5	0	0	0	0	2,151	11	0	50	0	23
Eau Claire	0	0	0	0	0	0	0	0	500	21	0	0	0	2,638
Jackson	0	0	0	0	0	0	0	0	0	24	0	0	0	76
Juneau	0	582	0	2,524	74	187	0	0	652	1,423	0	95	0	548
Marathon	0	0	0	674	228	925	0	0	12,380	3,669	0	99	0	5,633
Marquette	0	0	0	433	48	171	0	0	473	710	0	0	0	0
Monroe	0	0	0	1	0	0	0	0	500	3,402	0	0	0	791
Portage	111	0	0	0	0	0	0	0	759	4,537	0	0	0	825
Waupaca	0	0	0	19	7	24	0	0	2,133	0	0	0	0	1,368
Waushara	0	0	0	1,374	351	934	0	0	0	128	0	0	0	549
Wood	0	0	0	59	4	12	0	0	0	15,042	0	0	0	1,826
Unit total	111	582	0	5,852	787	2,380	0	0	23,485	36,023	0	475	0	18,553

(Table 3 continued on next page)

(Table 3 continued)

Unit and county	Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar	Basswood	Beech	White birch
SOUTHWEST UNIT														
Buffalo	0	0	0	0	0	0	0	0	0	607	0	405	0	0
Crawford	0	0	0	0	0	0	0	0	2	0	0	2	0	0
Dunn	0	135	0	0	0	0	0	0	7,536	4,655	0	0	0	0
Grant	0	0	0	622	610	1,197	0	0	0	4,999	0	0	0	0
Iowa	0	0	0	0	0	0	0	0	815	0	0	0	0	954
La Crosse	0	0	0	0	0	0	0	0	0	0	0	0	0	478
Lafayette	0	0	0	0	0	0	0	0	210	0	0	0	0	0
Pepin	0	0	0	0	0	0	0	0	378	1,548	0	660	0	442
Pierce	0	0	0	0	0	0	0	0	70	0	0	70	0	0
Richland	0	0	0	0	0	0	0	0	0	1,069	0	0	0	1,125
St. Croix	0	0	0	173	122	110	0	0	0	4,371	0	0	0	298
Sauk	0	0	0	0	0	0	0	0	414	1,756	0	841	0	1,492
Trempealeau	0	0	0	0	0	0	0	0	0	405	0	0	0	0
Vernon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unit total	0	135	0	795	732	1307	0	0	9,425	19,410	0	1,978	0	4,789
SOUTHEAST UNIT														
Brown	0	0	0	0	0	0	0	510	3,861	712	0	0	0	1,384
Calumet	0	0	0	0	0	0	0	0	226	0	0	311	0	0
Columbia	0	0	0	6	34	12	0	0	0	315	0	1,896	0	0
Dane	0	0	0	0	0	0	0	0	852	734	0	2,445	0	0
Dodge	0	0	0	5	2	30	0	0	100	151	6	160	18	26
Door	619	291	0	0	0	0	0	0	736	0	0	783	881	6,623
Fond du Lac	0	0	0	0	0	0	0	0	0	257	0	0	0	272
Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jefferson	0	0	0	0	0	0	0	0	1,064	520	0	0	0	71
Kenosha	0	0	0	0	0	0	0	0	100	0	0	0	0	0
Kewaunee	0	0	0	0	0	0	0	0	0	0	0	0	0	319
Manitowoc	0	0	0	0	0	0	0	0	0	213	0	0	0	0
Milwaukee	715	16	84	71	24	238	8	56	297	335	39	100	111	283
Outagamie	0	0	0	2	8	6,528	0	0	8,687	6,320	121	3,603	273	1,218
Ozaukee	231	3	22	276	0	179	3	35	861	1,488	123	277	155	1,700
Racine	0	0	0	0	0	0	0	0	95	797	11	32	22	85
Rock	0	0	0	0	0	0	0	0	394	0	0	0	0	0
Sheboygan	0	0	0	0	0	0	0	0	1,272	591	0	0	0	0
Walworth	0	0	0	0	0	0	0	0	0	66	0	13	0	0
Washington	0	0	0	62	15	214	0	0	881	0	0	0	0	150
Waukesha	0	0	0	0	0	0	0	0	417	3,534	8	35	16	757
Winnebago	0	0	0	0	0	0	0	0	0	298	0	0	0	525
Unit total	1,565	310	106	422	83	7,201	11	601	19,843	16,331	308	9,655	1,476	13,413
State total	2,501	4,111	6,426	12,094	9,568	13,176	867	687	69,031	103,491	316	26,191	3,423	98,095

(Table 3 continued on next page)

(Table 3 continued)

Unit and county	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Walnut	Other hardwoods	All species
NORTHEAST UNIT											
Florence	1,391	0	4,998	0	671	27	3,487	0	0	318	11,894
Forest	495	0	12,678	0	2,032	117	478	0	0	236	17,341
Langlade	179	0	18,361	460	8,663	1,068	1,534	0	0	412	35,078
Lincoln	1,112	0	7,436	120	5,995	2,184	5,114	0	0	30	33,695
Marinette	350	0	730	0	2,021	1,790	8,216	758	0	18	23,294
Menominee	224	0	8,560	96	1,276	946	2,616	323	0	0	14,177
Oconto	1,859	0	9,714	0	5,974	4,411	3,022	133	0	0	45,345
Oneida	1,493	0	359	0	9,594	6,674	8,252	0	0	2	63,406
Shawano	1,170	0	10,693	2,625	10,192	2,399	13,967	430	0	510	49,758
Vilas	755	0	693	0	8,325	1,153	4,530	542	0	357	25,864
Unit total	9,028	0	74,222	3,301	54,743	20,769	51,216	2,186	0	1,883	319,852
NORTHWEST UNIT											
Ashland	47	0	278	0	4,587	786	0	0	0	0	7,544
Barron	106	0	3,198	12	560	167	11,416	1,889	0	295	23,144
Bayfield	813	0	4,297	0	10,122	2,590	7,988	799	0	2	32,510
Burnett	252	0	4,206	0	413	187	18,979	4,123	0	0	31,549
Douglas	202	0	0	0	1,171	444	4,074	730	0	0	14,757
Iron	342	0	1,953	0	4,085	1,230	166	34	0	0	13,411
Polk	92	0	25,585	0	187	49	8,333	1,900	0	0	38,612
Price	276	0	8,896	0	5,898	1,828	8	2	0	44	17,838
Rusk	777	0	4,653	1,453	2,400	3,521	7,986	1,676	0	0	27,663
Sawyer	196	0	1,567	0	4,735	645	3,662	693	0	50	14,890
Taylor	649	0	5,832	752	16,089	5,122	1,230	225	0	16	34,559
Wahburn	295	0	480	1	1,649	656	6,527	1,378	0	7	13,415
Unit total	4,047	0	60,945	2,218	51,896	17,225	70,369	13,449	0	414	269,892
CENTRAL UNIT											
Adams	149	0	609	52	497	1,041	32,344	8,844	0	89	49,645
Chippewa	859	0	6,444	48	3,580	4,416	17,389	4,696	0	3,274	51,151
Clark	0	0	7,480	0	1,506	1,209	2,019	577	0	0	15,031
Eau Claire	551	0	1,383	0	333	380	35,739	9,945	0	0	51,490
Jackson	2	0	11,191	0	1,091	1,210	6,773	1,830	0	0	22,197
Juneau	146	0	2,677	18	842	1,280	17,647	5,198	0	32	33,925
Marathon	3698	0	33,597	414	8,775	5,765	9,945	3,044	0	671	89,517
Marquette	0	0	0	0	0	0	24,495	7,354	0	0	33,684
Monroe	172	0	2,895	0	853	908	12,332	3,414	0	0	25,268
Portage	354	0	1,172	0	1,079	961	5,998	1,811	0	168	17,775
Waupaca	470	0	2,986	1,605	4,364	3,789	8,450	2,309	0	449	27,973
Waushara	156	0	7,877	0	19	22	18,191	5,305	0	597	35,503
Wood	528	0	149	0	3,021	3,542	12,275	3,656	0	0	40,114
Unit total	7,085	0	78,460	2,137	25,960	24,523	203,597	57,983	0	5,280	493,273

(Table 3 continued on next page)

(Table 3 continued)

Unit and county	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Walnut	Other hardwoods	All species
SOUTHWEST UNIT											
Buffalo	0	0	105	0	1,425	841	4,849	1,824	0	0	10,056
Crawford	0	0	3,188	106	869	546	1,161	439	0	106	6,419
Dunn	0	0	13,104	0	739	416	8,693	2,936	0	405	38,619
Grant	0	0	14,362	1,581	81	0	18,149	6,820	80	8,483	56,984
Iowa	18	0	10,785	0	0	0	21,536	8,045	1,409	3,228	46,790
La Crosse	9	0	3,281	244	4,994	4,072	3,027	1,143	0	4,615	21,863
Lafayette	0	0	518	0	0	0	148	55	0	810	1,741
Pepin	0	109	8,541	620	692	970	4,937	1,849	0	301	21,047
Pierce	0	607	4,511	405	621	188	3,539	1,308	0	607	11,926
Richland	33	0	21,331	0	1,856	603	5,676	2,148	0	0	33,841
St. Croix	6	0	12,913	0	281	124	6,547	2,480	0	1,315	28,740
Sauk	23	118	14,852	844	1,007	860	17,889	6,691	0	1,247	48,034
Trempealeau	0	0	4,048	0	0	0	10,470	3,922	0	0	18,845
Vernon	0	0	12,795	0	0	0	5,325	1,974	0	304	20,398
Unit total	89	834	124,334	3,800	12,565	8,620	111,946	41,634	1,489	21,421	365,303
SOUTHEAST UNIT											
Brown	426	0	10,726	0	428	157	664	482	0	434	19,784
Calumet	0	0	1,050	0	82	32	1,049	725	0	0	3,475
Columbia	0	4	946	0	75	30	17,965	12,026	0	374	33,683
Dane	0	0	3,152	282	5,107	1,354	19,198	12,407	0	1,657	47,188
Dodge	4	508	5,345	30	124	74	2,013	1,489	4	401	10,490
Door	1,071	0	1,198	0	1,346	454	629	502	0	134	15,267
Fond du Lac	64	0	731	158	641	305	863	597	0	2,426	6,314
Green	0	789	6,080	0	807	244	620	431	163	789	9,923
Green Lake	0	0	0	0	0	0	0	0	0	0	0
Jefferson	20	0	2,294	495	1,479	550	1,457	1,024	0	8,779	17,753
Kenosha	0	0	1,795	0	4,956	1,417	8,062	5,689	0	0	22,019
Kewaunee	75	0	7,293	0	75	25	170	127	0	0	8,084
Manitowoc	0	0	1,705	0	204	84	194	144	0	1,183	3,727
Milwaukee	57	21	5,325	110	1,456	604	505	365	11	1,327	12,158
Outagamie	349	178	28,440	556	7,450	4,019	2,012	1,457	0	4,435	75,656
Ozaukee	321	49	2,254	384	3,759	1,927	3,042	2,212	3	2,521	21,825
Racine	17	7	179	1,692	201	100	2,152	1,557	3	444	7,394
Rock	0	0	2,410	276	1,360	731	9,824	6,423	0	2,123	23,541
Sheboygan	0	0	41,508	89	1,720	640	6,290	4,320	0	2,187	58,617
Walworth	0	0	118	53	88	30	1,220	857	0	197	2,642
Washington	47	500	5,737	0	821	353	2,075	1,533	0	2,447	14,835
Waukesha	111	11	7,008	2,803	1,277	666	7,854	5,511	7	7,693	37,708
Winnbegao	141	0	5,330	0	0	0	1,497	1,063	0	6,722	15,576
Unit total	2,703	2,067	140,624	6,928	33,456	13,796	89,355	60,941	191	46,273	467,659
State total	22,952	2,901	478,585	18,384	178,620	84,933	526,483	176,193	1,680	75,271	1,915,979

Table 4.--Fuelwood production from roundwood by source of material, species, and unit, Wisconsin, 1981

(In standard cords)

All UNITS

Species	All sources	Growing stock[1/]				Nongrowing stock sources					
		Total	Sawtimber		Pole-timber	Total	Tops, limb-wood [2/]	Saplings [1/]	Cull trees sections [1/]	Dead trees [1/]	Non-forest land [3/]
			Saw log portion	Upper stem							
SOFTWOODS											
Cedar	2,501	59	29	15	15	2,442	90	-	-	1,406	946
Balsam fir	4,111	378	160	87	131	3,733	510	-	73	2,123	1,027
Hemlock	6,426	87	29	29	29	6,339	200	-	14	6,019	106
Jack pine	12,094	1,162	531	157	474	10,932	659	-	216	7,109	2,948
Red pine	9,568	204	87	44	73	9,364	332	-	29	2,584	6,419
White pine	13,176	502	215	86	201	12,674	390	-	100	3,195	8,989
Spruce	867	87	29	29	29	780	247	-	14	491	28
Tamarack	687	189	72	46	71	498	126	-	29	252	91
Total	49,430	2,668	1,152	493	1,023	46,762	2,554	-	475	23,179	20,554
HARDWOODS											
Ash	69,031	16,732	7,520	2,537	6,675	52,299	10,841	57	3,380	21,282	16,739
Aspen	103,491	22,506	10,266	3,132	9,108	80,985	12,641	85	4,647	44,045	19,567
Balsam poplar	316	26	13	-	13	290	13	-	-	206	71
Basswood	26,191	3,254	1,448	530	1,276	22,937	2,367	14	659	18,726	1,171
Beech	3,423	670	299	100	271	2,753	399	-	143	1,507	704
Paper birch	98,095	20,550	8,982	3,689	7,879	77,545	18,905	100	3,948	45,308	9,284
Yellow birch	22,952	5,000	2,169	891	1,940	17,952	4,366	-	934	11,044	1,608
Cottonwood	2,901	73	29	15	29	2,828	74	-	-	1,106	1,648
Elm	478,585	32,271	13,949	6,131	12,191	446,314	33,555	243	6,045	263,614	142,857
Hickory	18,384	3,444	1,427	778	1,239	14,940	4,517	28	619	2,819	6,957
Hard maple	178,620	45,978	20,365	7,681	17,932	132,642	37,698	316	9,067	62,638	22,923
Soft maple	84,933	19,507	8,551	3,494	7,462	65,426	17,069	72	3,824	32,475	11,986
Red oak	526,483	92,725	40,711	16,234	35,780	433,758	83,465	700	17,976	256,103	75,514
White oak	176,193	26,127	11,319	4,835	9,973	150,066	24,935	128	4,922	86,865	33,216
Walnut	1,680	373	143	115	115	1,307	859	14	43	191	200
Other hdwds.	75,271	4,017	1,806	665	1,546	71,254	3,136	-	751	18,084	49,283
Total	1,866,549	293,253	128,997	50,827	113,429	1,573,296	254,840	1,757	56,958	866,013	393,728
All species	1,915,979	295,921	130,149	51,320	114,452	1,620,058	257,394	1,757	57,433	889,192	414,282

[1/] On commercial forest land.

[2/] From sawtimber and poletimber on commercial forest land.

[3/] Includes fuelwood from urban and suburban areas, fence rows, windbreaks, and trees on pasture and cropland.

Table 4 continued

NORTHEASTERN UNIT

Species	All sources	Growing stock[1/]				Nongrowing stock sources					
		Total	Sawtimber: Saw log portion	Sawtimber: Upper stem	Poletimber	Total	Tops, limbwood [2/]	Saplings [1/]	Cull trees sections [1/]	Dead trees [1/]	Nonforest land [3/]
SOFTWOODS											
Cedar	254	45	15	15	15	209	90	-	-	119	-
Balsam fir	684	189	73	58	58	495	437	-	29	29	-
Hemlock	5,858	87	29	29	29	5,771	200	-	14	5,557	-
Jack pine	3,593	285	114	57	114	3,308	271	-	43	2,971	23
Red pine	7,821	101	43	29	29	7,720	272	-	14	2,043	5,391
White pine	2,032	101	29	43	29	1,931	231	-	14	1,657	29
Spruce	363	87	29	29	29	276	247	-	14	15	-
Tamarack	86	17	-	17	-	69	69	-	-	-	-
Total	20,691	912	332	277	303	19,779	1,817	-	128	12,391	5,443
HARDWOODS											
Ash	8,293	2,399	1,026	491	882	5,894	2,818	14	433	2,619	10
Aspen	19,565	6,660	3,087	800	2,773	12,905	2,615	14	1,415	6,860	2,001
Balsam poplar	-	-	-	-	-	-	-	-	-	-	-
Basswood	7,169	457	200	71	186	6,712	186	-	100	6,426	-
Beech	1,947	343	157	43	143	1,604	129	-	72	819	584
Paper birch	44,839	10,109	4,347	1,959	3,803	34,730	10,695	86	1,916	19,531	2,502
Yellow birch	9,028	2,518	1,087	444	987	6,510	2,146	-	458	3,474	432
Cottonwood	-	-	-	-	-	-	-	-	-	-	-
Elm	74,222	7,516	3,158	1,643	2,715	66,706	9,803	71	1,343	51,784	3,705
Hickory	3,301	1,187	492	275	420	2,114	1,781	14	189	110	20
Hard maple	54,743	16,719	7,288	3,044	6,387	38,024	15,847	129	3,244	18,376	428
Soft maple	20,769	5,532	2,422	1,003	2,107	15,237	4,931	29	1,089	8,937	251
Red oak	51,216	10,108	4,289	2,059	3,760	41,108	11,453	71	1,859	25,004	2,721
White oak	2,186	371	157	71	143	1,815	286	-	71	1,164	294
Walnut	-	-	-	-	-	-	-	-	-	-	-
Other hdwds.	1,883	508	239	75	194	1,375	538	-	75	748	14
Total	299,161	64,427	27,949	11,978	24,500	234,734	63,228	428	12,264	145,852	12,962
All species	319,852	65,339	28,281	12,255	24,803	254,513	65,045	428	12,392	158,243	18,405

[1/] On commercial forest land.

[2/] From sawtimber and poletimber on commercial forest land.

[3/] Includes fuelwood from urban and suburban areas, fence rows, windbreaks, and trees on pasture and cropland.

Table 4 continued

NORTHWESTERN UNIT

Species	All sources	Growing stock[1/]				Nongrowing stock sources					
			Sawtimber								
		Total	Saw log portion	Upper stem	Pole-timber	Total	Tops, limb-wood [2/]	Sap-lings [1/]	Cull trees sections [1/]	Dead trees [1/]	Non-forest land [3/]
SOFTWOODS											
Cedar	571	-	-	-	-	571	-	-	-	571	-
Balsam fir	2,400	14	-	14	-	2,386	-	-	-	1,513	873
Hemlock	462	-	-	-	-	462	-	-	-	462	-
Jack pine	1,432	114	57	14	43	1,318	100	-	14	519	685
Red pine	145	-	-	-	-	145	16	-	-	129	-
White pine	256	-	-	-	-	256	16	-	-	240	-
Spruce	493	-	-	-	-	493	-	-	-	476	17
Tamarack	-	-	-	-	-	-	-	-	-	-	-
Total	5,759	128	57	28	43	5,631	132	-	14	3,910	1,575
HARDWOODS											
Ash	7,985	2,523	1,161	330	1,032	5,462	1,004	-	516	1,198	2,744
Aspen	12,162	1,648	774	215	659	10,514	1,132	-	344	6,996	2,042
Balsam poplar	8	-	-	-	-	8	-	-	-	5	2
Basswood	6,914	57	29	14	14	6,857	43	-	14	6,746	54
Beech	-	-	-	-	-	-	-	-	-	-	-
Paper birch	16,501	4,612	2,077	702	1,833	11,889	3,037	-	917	4,953	2,982
Yellow birch	4,047	1,131	493	174	464	2,916	769	-	203	1,234	710
Cottonwood	-	-	-	-	-	-	-	-	-	-	-
Elm	60,945	5,387	2,429	786	2,172	55,558	3,558	29	1,072	26,975	23,924
Hickory	2,218	864	360	187	317	1,354	1,081	14	158	100	1
Hard maple	51,896	16,164	7,324	2,332	6,508	35,732	9,956	86	3,290	18,684	3,716
Soft maple	17,225	3,876	1,737	603	1,536	13,349	2,641	-	775	5,925	4,008
Red oak	70,369	23,075	10,352	3,613	9,110	47,294	17,008	171	4,627	17,572	7,916
White oak	13,449	4,387	1,985	676	1,726	9,062	3,151	-	863	3,419	1,629
Walnut	-	-	-	-	-	-	-	-	-	-	-
Other hdwds.	414	200	92	31	77	214	77	-	46	49	42
Total	264,133	63,924	28,813	9,663	25,448	200,209	43,457	300	12,825	93,857	49,770
	269,892	64,052	28,870	9,691	25,491	205,840	43,589	300	12,839	97,767	51,345

[1/] On commercial forest land.

[2/] From sawtimber and poletimber on commercial forest land.

[3/] Includes fuelwood from urban and suburban areas, fence rows, windbreaks, and trees on pasture and cropland.

Table 4 continued

CENTRAL UNIT

Species	All sources	Growing stock[1/]				Nongrowing stock sources					
			Sawtimber								
		Total	Saw log portion	Upper stem	Pole-timber	Total	Tops, limb-wood [2/]	Sap-lings [1/]	Cull trees sections [1/]	Dead trees [1/]	Non-forest land [3/]
SOFTWOODS											
Cedar	111	-	-	-	-	111	-	-	-	111	-
Balsam fir	582	175	87	15	73	407	73	-	44	290	-
Hemlock	-	-	-	-	-	-	-	-	-	-	-
Jack pine	5,852	763	360	86	317	5,089	288	-	159	3,249	1,393
Red pine	787	103	44	15	44	684	44	-	15	267	358
White pine	2,380	401	186	43	172	1,979	143	-	86	792	958
Spruce	-	-	-	-	-	-	-	-	-	-	-
Tamarack	-	-	-	-	-	-	-	-	-	-	-
Total	9,712	1,442	677	159	606	8,270	548	-	304	4,709	2,709
HARDWOODS											
Ash	23,485	7,529	3,386	1,129	3,014	15,956	4,771	29	1,543	9,439	174
Aspen	36,023	8,796	3,933	1,359	3,504	27,227	5,978	57	1,759	18,426	1,007
Balsam poplar	-	-	-	-	-	-	-	-	-	-	-
Basswood	475	28	14	-	14	447	14	-	-	433	-
Beech	-	-	-	-	-	-	-	-	-	-	-
Paper birch	18,553	2,925	1,270	542	1,113	15,628	2,826	-	542	12,167	93
Yellow birch	7,085	889	387	186	316	6,196	1,090	-	172	4,909	25
Cottonwood	-	-	-	-	-	-	-	-	-	-	-
Elm	78,460	8,764	3,860	1,530	3,374	69,696	7,877	57	1,687	38,603	21,472
Hickory	2,137	707	289	173	245	1,430	1,141	-	130	159	-
Hard maple	25,960	5,856	2,477	1,246	2,133	20,104	7,145	43	1,060	10,730	1,126
Soft maple	24,523	5,187	2,201	1,100	1,886	19,336	6,274	29	972	11,138	923
Red oak	203,597	35,809	15,976	5,744	14,089	167,788	27,422	243	7,130	121,245	11,748
White oak	57,983	10,188	4,501	1,672	4,015	47,795	7,773	57	2,015	34,634	3,316
Walnut	-	-	-	-	-	-	-	-	-	-	-
Other hdwds.	5,280	760	344	115	301	4,520	445	-	143	2,504	1,428
Total	483,561	87,438	38,638	14,796	34,004	396,123	72,756	515	17,153	264,387	41,312
All species	493,273	88,880	39,315	14,955	34,610	404,393	73,304	515	17,457	269,096	44,021

[1/] On commercial forest land.

[2/] From sawtimber and poletimber on commercial forest land.

[3/] Includes fuelwood from urban and suburban areas, fence rows, windbreaks, and trees on pasture and cropland.

Table 4 continued

SOUTHWESTERN UNIT

Species	All sources	Growing stock[1/]				Nongrowing stock sources					
		Total	Sawtimber		Pole-timber	Total	Tops, limb-wood [2/]	Sap-lings[1/]	Cull trees sections[1/]	Dead trees[1/]	Non-forest land[3/]
			Saw log portion	Upper stem							
SOFTWOODS											
Cedar	-	-	-	-	-	-	-	-	-	-	-
Balsam fir	135	-	-	-	-	135	-	-	-	-	135
Hemlock	-	-	-	-	-	-	-	-	-	-	-
Jack pine	795	-	-	-	-	795	-	-	-	173	622
Red pine	732	-	-	-	-	732	-	-	-	122	610
White pine	1,307	-	-	-	-	1,307	-	-	-	110	1,197
Spruce	-	-	-	-	-	-	-	-	-	-	-
Tamarack	-	-	-	-	-	-	-	-	-	-	-
Total	2,969	-	-	-	-	2,969	-	-	-	405	2,564
HARDWOODS											
Ash	9,425	387	172	57	158	9,038	258	-	72	1,422	7,286
Aspen	19,410	1,602	715	272	615	17,808	1,344	-	329	6,505	9,630
Balsam poplar	-	-	-	-	-	-	-	-	-	-	-
Basswood	1,978	620	274	101	245	1,358	448	-	130	780	-
Beech	-	-	-	-	-	-	-	-	-	-	-
Paper birch	4,789	517	230	86	201	4,272	331	-	101	2,000	1,940
Yellow birch	89	-	-	-	-	89	-	-	-	42	47
Cottonwood	834	45	15	15	15	789	60	-	-	122	607
Elm	124,334	7,474	3,087	1,729	2,658	116,860	10,431	86	1,329	56,008	49,006
Hickory	3,800	399	171	71	157	3,401	342	-	85	1,137	1,837
Hard maple	12,565	4,002	1,815	572	1,615	8,563	2,487	29	843	3,528	1,676
Soft maple	8,620	3,259	1,487	457	1,315	5,361	1,973	14	672	1,927	775
Red oak	111,946	16,366	7,090	3,030	6,246	95,580	16,037	143	3,130	49,095	27,175
White oak	41,634	6,166	2,647	1,173	2,346	35,468	6,009	14	1,187	18,404	9,854
Walnut	1,489	373	143	115	115	1,116	859	14	43	62	138
Other hdwds.	21,421	1,562	688	272	602	19,859	1,404	-	287	2,738	15,430
Total	362,334	42,772	18,534	7,950	16,288	319,562	41,983	300	8,208	143,770	125,301
All species	365,303	42,772	18,534	7,950	16,288	322,531	41,983	300	8,208	144,175	127,865

[1/] On commercial forest land.

[2/] From sawtimber and poletimber on commercial forest land.

[3/] Includes fuelwood from urban and suburban areas, fence rows, windbreaks, and trees on pasture and cropland.

Table 4 continued

SOUTHEASTERN UNIT

Species	All sources	Growing stock[1]				Nongrowing stock sources					
			Sawtimber								
		Total	Saw log portion	Upper stem	Pole-timber	Total	Tops, limb-wood[2]	Sap-lings[1]	Cull trees sections[1]	Dead trees[1]	Non-forest land[3]
SOFTWOODS											
Cedar	1,565	14	14	-	-	1,551	-	-	-	505	946
Balsam fir	310	-	-	-	-	310	-	-	-	291	19
Hemlock	106	-	-	-	-	106	-	-	-	-	106
Jack pine	422	-	-	-	-	422	-	-	-	197	225
Red pine	83	-	-	-	-	83	-	-	-	23	60
White pine	7,201	-	-	-	-	7,201	-	-	-	396	6,805
Spruce	11	-	-	-	-	11	-	-	-	-	11
Tamarack	601	172	72	29	71	429	57	-	29	252	91
Total	10,299	186	86	29	71	10,113	57	-	29	1,764	8,263
HARDWOODS											
Ash	19,843	3,894	1,775	530	1,589	15,949	1,990	14	816	6,604	6,525
Aspen	16,331	3,800	1,757	486	1,557	12,531	1,572	14	800	5,258	4,887
Balsam poplar	308	26	13	-	13	282	13	-	-	200	69
Basswood	9,655	2,092	931	344	817	7,563	1,676	14	415	4,341	1,117
Beech	1,476	327	142	57	128	1,149	270	-	71	688	120
Paper birch	13,413	2,387	1,058	400	929	11,026	2,016	14	472	6,657	1,867
Yellow birch	2,703	462	202	87	173	2,241	361	-	101	1,385	394
Cottonwood	2,067	28	14	-	14	2,039	14	-	-	984	1,041
Elm	140,624	3,130	1,415	443	1,272	137,494	1,886	-	614	90,244	44,750
Hickory	6,928	287	115	72	100	6,641	172	-	57	1,313	5,099
Hard maple	33,456	3,237	1,461	487	1,289	30,219	2,263	29	630	11,320	15,977
Soft maple	13,796	1,653	704	331	618	12,143	1,250	-	316	4,548	6,029
Red oak	89,355	7,367	3,004	1,788	2,575	81,988	11,545	72	1,230	43,187	25,954
White oak	60,941	5,015	2,029	1,243	1,743	55,926	7,716	57	786	29,244	18,123
Walnut	191	-	-	-	-	191	-	-	-	129	62
Other hdwds.	46,273	987	443	172	372	45,286	672	-	200	12,045	32,369
Total	457,360	34,692	15,063	6,440	13,189	422,668	33,416	214	6,508	218,147	164,383
All species	467,659	34,878	15,149	6,469	13,260	432,781	33,473	214	6,537	219,911	172,646

[1] On commercial forest land.

[2] From sawtimber and poletimber on commercial forest land.

[3] Includes fuelwood from urban and suburban areas, fence rows, windbreaks, and trees on pasture and cropland.

Table 5.--Fuelwood production from primary wood-using mill residue by Unit, type of residue, and species group, Wisconsin, 1981

(In standard cord equivalents)[1/]

Type of use	All species			Softwood			Hardwood		
	Total	Coarse[2/]	Fine[3/]	Total	Coarse	Fine	Total	Coarse	Fine
ALL UNITS									
Industrial fuel	152,165	64,205	87,960	20,518	10,670	9,848	131,647	53,535	78,112
Domestic fuel	97,368	90,393	6,975	18,041	16,806	1,235	79,327	73,587	5,740
Total	249,533	154,598	94,935	38,559	27,476	11,083	210,974	127,122	83,852
NORTHEASTERN UNIT									
Industrial fuel	68,617	27,726	40,891	15,033	7,900	7,133	53,584	19,826	33,758
Domestic fuel	19,682	17,248	2,434	5,842	4,665	1,177	13,840	12,583	1,257
Total	88,299	44,974	43,325	20,875	12,565	8,310	67,424	32,409	35,015
NORTHWESTERN UNIT									
Industrial fuel	37,242	16,339	20,903	3,184	968	2,216	34,058	15,371	18,687
Domestic fuel	14,909	11,758	3,151	5,223	5,214	9	9,686	6,544	3,142
Total	52,151	28,097	24,054	8,407	6,182	2,225	43,744	21,915	21,829
CENTRAL UNIT									
Industrial fuel	15,709	5,541	10,168	1,424	1,006	418	14,285	4,535	9,750
Domestic fuel	28,353	27,077	1,276	4,396	4,377	19	23,957	22,700	1,257
Total	44,062	32,618	11,444	5,820	5,383	437	38,242	27,235	11,007
SOUTHWESTERN UNIT									
Industrial fuel	26,978	12,654	14,324	454	403	51	26,524	12,251	14,273
Domestic fuel	28,613	28,504	109	2,016	1,987	29	26,597	26,517	80
Total	55,591	41,158	14,433	2,470	2,390	80	53,121	38,768	14,353
SOUTHEASTERN UNIT									
Industrial fuel	3,619	1,945	1,674	423	393	30	3,196	1,552	1,644
Domestic fuel	5,811	5,806	5	564	563	1	5,247	5,243	4
Total	9,430	7,751	1,679	987	956	31	8,443	6,795	1,648

[1/] A cord equivalent contains 70 cubic feet of solid wood.

[2/] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[3/] Not suitable for chipping such as sawdust, veneer clippings, etc.

Table 6.--Fuelwood production from roundwood and primary wood-using mill residue by Unit and species group, Wisconsin, 1981

(In standard cords)

Source and species group	All Units	North-eastern Unit	North-western Unit	Central Unit	South-western Unit	South-eastern Unit
ROUNDWOOD						
Softwoods						
Cedar	2,501	254	571	111	-	1,565
Balsam fir	4,111	684	2,400	582	135	310
Hemlock	6,426	5,858	462	-	-	106
Jack pine	12,094	3,593	1,432	5,852	795	422
Red pine	9,568	7,821	145	787	732	83
White pine	13,176	2,032	256	2,380	1,307	7,201
Spruce	867	363	493	-	-	11
Tamarack	687	86	-	-	-	601
Total	49,430	20,691	5,759	9,712	2,969	10,299
Hardwoods						
Ash	69,031	8,293	7,985	23,485	9,425	19,843
Aspen	103,491	19,565	12,162	36,023	19,410	16,331
Balsam poplar	316	-	8	-	-	308
Basswood	26,191	7,169	6,914	475	1,978	9,655
Beech	3,423	1,947	-	-	-	1,476
White birch	98,095	44,839	16,501	18,553	4,789	13,413
Yellow birch	22,952	9,028	4,047	7,085	89	2,703
Cottonwood	2,901	-	-	-	834	2,067
Elm	478,585	74,222	60,945	78,460	124,334	140,624
Hickory	18,384	3,301	2,218	2,137	3,800	6,928
Hard maple	178,620	54,743	51,896	25,960	12,565	33,456
Soft maple	84,933	20,769	17,225	24,523	8,620	13,796
Red oak	526,483	51,216	70,369	203,597	111,946	89,355
White oak	176,193	2,186	13,449	57,983	41,634	60,941
Walnut	1,680	-	-	-	1,489	191
Other hwds.	75,271	1,883	414	5,280	21,421	46,273
Total	1,866,549	299,161	264,133	483,561	362,334	457,360
All species	1,915,979	319,852	269,892	493,273	365,303	467,659
MILL RESIDUE						
Softwoods	38,559	20,875	8,407	5,820	2,470	987
Hardwoods	210,974	67,424	43,744	38,242	53,121	8,443
Total	249,533	88,299	52,151	44,062	55,591	9,430
ALL SOURCES						
Softwoods	87,989	41,566	14,166	15,532	5,439	11,286
Hardwoods	2,077,523	366,585	307,877	521,803	415,455	465,803
Total	2,165,512	408,151	322,043	537,335	420,894	477,089

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Fuelwood production and sources in Wisconsin, 1981. Resour. Bull. NC-75. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1984. 54 p.

Discusses and analyzes 1981 Wisconsin fuelwood production from roundwood and primary wood-using mill residue. Analyzes production by geographic area, type of producer, species, landowner class, type of land, and tree source.

KEY WORDS: Growing stock, households, loggers, roundwood, residue.

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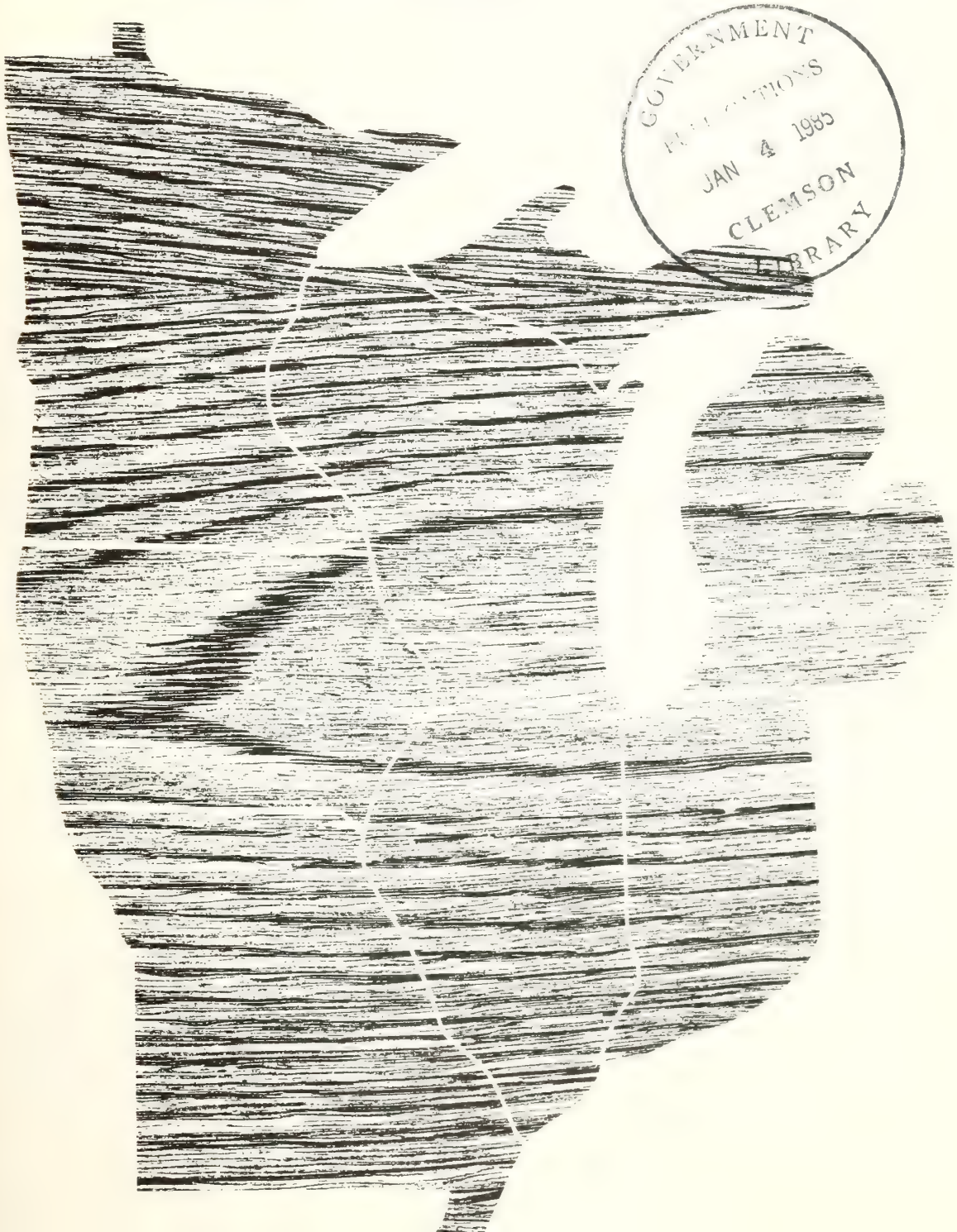
Resource Bulletin **NC-76**

Veneer Industry and Timber Use, North Central Region, 1980

James E. Blyth and W. Brad Smith



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VENEER INDUSTRY AND TIMBER USE, NORTH CENTRAL REGION, 1980

James E. Blyth, *Principal Market Analyst, and* **W. Brad Smith,** *Mensurationist*

HIGHLIGHTS

Lake States

- In the Lake States veneer log production in 1980 was 64.1 million board feet, down 8 percent from 1976 when the last veneer industry study was made. Major production declines since 1976 were in elm, aspen, and hard maple. Log exports to other States and Canada climbed to a record 7.5 million board feet.
- Twenty-eight Lake States veneer mills received 58.7 million board feet of logs, off 11 percent from 1976. Imports were the lowest in 35 years and have been declining since 1966.
- More than 99 percent of the wood and bark residue generated at mills in 1980 was used.

Central States

- Central States loggers harvested 21.8 million board feet of veneer logs in 1980, off 20 percent from 1976. White oak was the leading species cut—in 1980 the volume harvested was 5 times more than that in 1970.
- Compared to 1976, veneer log receipts at 22 mills fell 9 percent to 32.9 million board feet. Imports of 14.1 million board feet came from 17 other States.
- Disposal of wood and bark residue at mills has not been a problem since 1974. Industrial fuel was the leading use for this residue.

This report of 1980 veneer log production and receipts in the North Central Region is a continuation of a series begun more than 24 years ago. On a total volume basis, veneer logs are the third most valuable industrial roundwood product harvested, outranked only by pulpwood and saw logs. The last veneer industry study was in 1976.

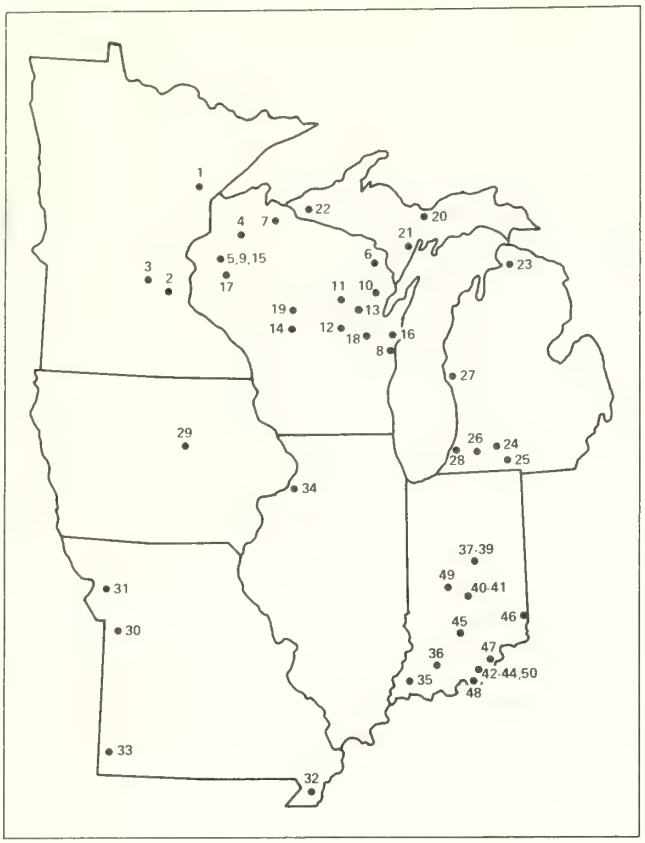
Current detailed veneer log production[1] and receipt information is necessary for intelligent planning and decision making in wood procurement, forest resource management, and forest industry development. In addition, researchers need veneer log harvest and receipt information for planning projects and analyzing and appraising the veneer industry.

All known veneer mills in the United States and Canada using North Central States timber reported their veneer log receipts in 1980 by species groups and State of origin. For the wood and bark residue they generated in 1980, they reported (in percent) the disposal of coarse wood residue (chippable), fine wood residue, and bark in six disposal categories. Their cooperation is gratefully acknowledged. Data were collected, using a formal questionnaire, in a cooperative effort by this Station; the Northeastern Forest Experiment Station; the Southern Forest Experiment Station; and the State forestry agencies in Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, and Wisconsin. Data are not shown for logs exported to countries other than Canada.

All board feet data in this report have been converted to International ¼-inch scale by applying a multiplier of 1.14 to all log volumes reported by veneer mills in Doyle scale and applying a multiplier of 1.04 to all log volumes reported by mills in Scribner Dec. C Scale. To convert to Doyle log scale, multiply the International scale volume by 0.8772. To convert to Scribner Dec. C. log scale, multiply the International scale volume by 0.9615.

This report presents the results of the survey, analyzes and interprets the data where appropriate,

[1] *Production is the volume of veneer logs cut from a specific area; receipts are the volume of veneer logs received by mills in a specific area regardless of geographic source.*



MINNESOTA		
Number	Name of mill	Location
1	Diamond International Co.	Cloquet
2	Allen Wood Products, Inc.	Hopkins
3	Elk River Box Company	Elk River
	WISCONSIN	
4	Birchwood Lumber & Veneer Co.	Birchwood
5	Birchwood Mfg. Co.	Rice Lake
6	Louisiana-Pacific Corp.	Goodman
7	Louisiana-Pacific Corp.	Mellen
8	Eggers Plywood Co.	Two Rivers
9	Brunette Ind. Wood Prod.	Rice Lake
10	Linwood, Inc.	Gillett
11	Wisconsin Timber & Land Co.	Matoon

WISCONSIN		
Number	Name of mill	Location
12	Marion Plywood Corp.	Marion
13	Weber Veneer & Plywood Co.	Shawano
14	Weyerhaeuser Co.	Marshfield
15	Brunette Box & Veneer	Rice Lake
16	Dufeck Mfg. Co.	Denmark
17	Ebner Box Factory	Cameron
18	Seymour Woodenware Co.	Seymour
19	Standard Container Co.	Edgar
	MICHIGAN	
20	Cliffs Forest Products Co.	Munsing
21	Anthony & Co.	Escanaba
22	Iron Wood Products	Bessemer
23	Manthei Bros.	Petosky
24	A. C. Hensel Mfg. Co.	Augusta
25	Worldwide Veneer Co.	Coldwater
26	Fruit Growers Package Co.	Paw Paw
27	Michigan Crate & Basket	Shelby
28	Riverside Package Co.	Riverside
	IOWA	
29	R. S. Bacon Veneer Co.	Grundy Center
	MISSOURI	
30	Vario Veneer Corp.	Pleasant Hill
31	Missouri Valley Walnut Co.	St. Joseph
32	Tipton Box Co.	Caruthersville
33	Crumbliss Wood Products	Neosho
	ILLINOIS	
34	Swords Veneer & Lumber Co.	Rock Island
	INDIANA	
35	Evansville Veneer Co.	Evansville
36	Jasper Veneer Mills	Jasper
37	Central Veneer Co., Inc.	Indianapolis
38	Curry Miller Veneers, Inc.	Indianapolis
39	Indiana Veneers, Inc.	Indianapolis
40	David R. Webb Co.	Edinburg
41	Amos Hill Veneer Co.	Edinburg
42	B. L. Curry & Sons	New Albany
43	Chester B. Stem, Inc.	New Albany
44	Adams Custom Veneer Co.	New Albany
45	National Veneer & Lumber Co.	Seymour
46	Pierson-Holowell Co., Inc.	Lawrenceburg
47	Roberts & Strack Veneer Co.	Clarksville
48	Norstram Veneers	Mauckport
49	Theising Veneer Co., Inc.	Mooresville
50	New Albany Box & Basket Co., Inc.	New Albany

Figure 1.—*Location of active veneer mills in the North Central Region, 1980.*

compares the results with 1976 or earlier years, and discusses trends in veneer log production and use. After a brief national overview, the report is divided into two sections—Lake States (Michigan, Minnesota, and Wisconsin) and Central States (Illinois, Indiana, Iowa, and Missouri)—because different species are grown and used as veneer logs in each area.

Fifty veneer mills operated in the region in 1980, six less than in 1976 (fig. 1). Between 1976 and 1980, eight mills closed, another burned and is being rebuilt, and three new mills opened. Net losses included one in Minnesota (being rebuilt), two in Wisconsin, one in Iowa, one in Illinois, and one in Indiana.

NATIONAL OVERVIEW

National hardwood plywood production in 1980 fell 9.6 percent below 1979 and 10.3 percent below 1976 to 1,312.1 million square feet[2] surface measure. Principal face ply species were birch and oak.

Housing starts plunged 25 percent in 1980 to 1,328,000[3] . This decline in home construction led to

[2]*Source: U.S. Department of Commerce, Bureau of the Census. Current Industrial Report Series MA-24F*

[3]*Source: F.W. Dodge Division of McGraw-Hill Information Systems.*

ower consumption of hardwood plywood for interior valls, kitchen and vanity cabinets, flush doors, floor-ng, and furniture.

The prefinished hardwood plywood industry felt he brunt of the economic downturn resulting from ight money and high interest rates. The laminated ardwood flooring industry had to compete with mported hardwood flooring, particularly in architec-ural and fancy type floors.

One bright spot was the 15 percent sales increase in he distribution segment of the panel market. The istribution segment supplies the booming do-it-your-elf market and the steadily increasing home re-nodeling and additions market served by contractors.

LAKE STATES

Production

Lake States loggers cut 64.1 million board feet of eneer logs in 1980, off 5.5 million board feet from 976. Demand for veneer fell in the housing, furni-ure, and container markets, which are widely served y Lake States veneer mills. Two-thirds of the volume vas supplied by three species:

pecies	Million board feet
spen	20.2
ard maple	12.8
ed oak	10.7

Major production declines since 1976 were in elm 3.4 million board feet), aspen (1.6 million board feet), nd hard maple (1.3 million board feet). Elm produc-on dropped to the lowest level recorded in the last 35 ears because much of the Lake States elm resource as been lost to Dutch Elm disease. Demand for white ak rose sharply from only 700,000 board feet in 1976 3,600,000 board feet in 1980. White oak veneer logs ere first produced in the Lake States in 1966.

Log exports climbed to a record 7.5 million board et. By volume, primary export markets were:

estination	Million board feet
anada	4.3
diana	2.1
hio	0.7

Michigan accounted for more than half of the arvest at 36.8 million board feet, a gain of 10 percent ver 1976. Aspen and hard maple dominated the lichigan harvest. Two-fifths of the volume was estined for out-of-State markets. Major species ipped from Michigan were hard maple, red oak, id white oak.

Wisconsin's harvest of 20.9 million board feet was more than half red oak and aspen with 25 percent of the harvest exported to Michigan. Compared to 1976, aspen output dropped 43 percent, elm fell 51 percent, and hard maple declined 40 percent.

The two primary species cut in Minnesota were aspen (3.5 million board feet) and red oak (1.4 million board feet), accounting for 76 percent of the total Minnesota cut (6.5 million board feet).

Mill Receipts

Lake States veneer mills received 58.7 million board feet of logs in 1980, down 7.6 million board feet from 1976. Declines in receipts were concentrated in elm, red oak, and aspen. Imports were the lowest in 35 years, although log receipts from Canada were about the same as in 1976. Imports have been declining since 1966.

Michigan's nine veneer mills procured 27.3 million board feet of logs, a drop of 5 percent from 1976. Demand continued to be highest for aspen. Michigan imported wood only from Wisconsin.

Wisconsin's mills imported 47 percent of their receipts from contiguous States.

Mill Residue[4]

More than 99 percent of the mill residue generated in each class (coarse, fine, and bark) during 1980 was used, a marked improvement over the 66 percent of fines and 72 percent of bark used in 1976. Nine out of 10 tons of fine residue were burned for industrial fuel as well as 95 out of 100 tons of bark. Coarse residue was used chiefly for industrial fuel and fiber products (pulp manufacturing).

Industry Outlook

Hardwood plywood production will improve from recessionary lows with increasing housing starts. However, the gains will be limited by competition from waferboard and oriented strand board (OSB). These boards are good plywood substitutes. They may make inroads for such uses as toys, doll houses, outdoor furniture, storage carts, bookcases, and bedboards. Several Lake States waferboard and OSB plants have opened since 1980.

---

[4]*Mill residue generated at veneer mills is classed as: (1) bark; (2) coarse (wood)—suitable for chipping, such as veneer cores; or (3) fine (wood)—not suitable for chipping such as veneer clippings.*

Since 1970, the trend has been toward more veneer log exports from the Lake States to Canada and other States and fewer veneer log imports into the Lake States. This trend is likely to continue as the hardwood growing stock resource continues to expand in the Lake States. Demand for veneer in containers will probably continue to fall.

CENTRAL STATES

Production

Central States loggers cut 21.8 million board feet of veneer logs in 1980, down 20 percent from 1976 and down 45 percent from the peak production recorded in 1960. Principal species cut were:

Species
White oak
Walnut
Red oak
Cottonwood

White oak production increased in 1980 to 5 times the 1970 level. Walnut output declined nearly one-half from 1972. During the 1970's demand for oak veneer in furniture climbed while demand for walnut veneer in furniture fell. Cottonwood log production (used in containers) peaked in 1960 and has declined irregularly since then.

Major harvest changes between 1976 and 1980 were:

Species	Thousand board feet
Walnut	-2,450
White oak	+891
Cottonwood	-738
Soft maple	-649

Exports plunged 52 percent lower from 1976 to 3.0 million board feet; primary purchasers were in Wisconsin (52 percent), Ohio (27 percent), and Kentucky (17 percent).

Indiana furnished 49 percent of the Central States veneer log harvest and used 85 percent of its production. Each of the other States cut between 3.2 and 4.0 million board feet. Missouri was the only Central State to increase log output between 1976 and 1980. The major portion of cottonwood production shifted from Illinois in 1976 to Missouri in 1980.

Mill Receipts

Twenty-two Central States veneer mills received 32.9 million board feet of veneer logs in 1980, the lowest volume since 1970. Seventeen States, from all areas except the far West, shipped 14.1 million board feet of logs to the Central States. Kentucky, Ohio, Michigan, Oklahoma, and Pennsylvania each supplied more than 1 million board feet. Major imports included white oak from Kentucky and Ohio, red oak from Michigan, pecan from Oklahoma, and black cherry from Pennsylvania. Other States furnishing veneer logs were Alabama, Arkansas, North Carolina, Mississippi, Kansas, Nebraska, Wisconsin, Minnesota, Tennessee, Texas, Louisiana, and West Virginia.

More than four-fifths (83 percent) of the Central States total log receipts in 1980 went to Indiana's 16 veneer mills, including more than 90 percent each of the black cherry, hard maple, pecan, red oak, and yellow-poplar.

Plant Residue

Disposal of wood and bark residue has not been a problem since 1974. All of the coarse wood residue, 92 percent of the fine wood residue, and 94 percent of the bark was used in 1980. Industrial fuel was the leading use for each residue category; other uses were in pulp manufacturing, mulch, livestock bedding, and domestic (household) fuel.

Industry Outlook

Higher demand for new housing should lead to greater veneer log production in the Central States to provide veneer for furniture, paneling, kitchen cabinets, etc. However increased competition from waferboard and oriented strand board is likely to dampen the recovery for hardwood plywood markets.

Container veneer markets will probably continue to weaken due to heavy competition from plastics and other substitute materials.

Table 1.--Production and imports of veneer logs, Lake States, 1980

(In thousand board feet)[1/]

ecies and estination	Total receipts[3/]	Production by States[2/]				Imports		
		Michigan	Minnesota	Wisconsin	Regional total	Other U.S.	Canada	Total imports
ne								
Minnesota-Wisconsin	240	52	--	188	240	--	--	--
Total	240	52	--	188	240	--	--	--
h								
Michigan	329	329	--	--	329	--	--	--
Minnesota-Wisconsin	476	52	52	287	391	85	--	85
Exported[4/]	--	111	--	--	111	--	--	--
Total	805	492	52	287	831	85	--	85
pen								
Michigan	15,746	10,546	--	5,200	15,746	--	--	--
Minnesota-Wisconsin	4,212	250	3,411	551	4,212	--	--	--
Exported[4/]	--	203	84	--	287	--	--	--
Total	19,958	10,999	3,495	5,751	20,245	--	--	--
sswood								
Michigan	257	257	--	--	257	--	--	--
Minnesota-Wisconsin	1,843	124	190	1,445	1,759	84	--	84
Exported[4/]	--	56	--	--	56	--	--	--
Total	2,100	437	190	1,445	2,072	84	--	84
ech								
Michigan	854	854	--	--	854	--	--	--
Minnesota-Wisconsin	196	172	--	24	196	--	--	--
Exported[4/]	--	57	--	--	57	--	--	--
Total	1,050	1,083	--	24	1,107	--	--	--
ack cherry								
Michigan	59	59	--	--	59	--	--	--
Minnesota-Wisconsin	18	4	--	14	18	--	--	--
Exported[4/]	--	152	--	--	152	--	--	--
Total	77	215	--	14	229	--	--	--
tternut								
Exported[4/]	--	--	--	5	5	--	--	--
Total	--	--	--	5	5	--	--	--
ttonwood								
Michigan	475	475	--	--	475	--	--	--
Minnesota-Wisconsin	779	--	447	332	779	--	--	--
Exported[4/]	--	--	--	68	68	--	--	--
Total	1,254	475	447	400	1,322	--	--	--
n								
Minnesota-Wisconsin	2,130	292	175	1,653	2,120	10	--	10
Exported[4/]	--	26	438	739	1,203	--	--	--
Total	2,130	318	613	2,392	3,323	10	--	10
d maple								
Michigan	3,573	3,573	--	--	3,573	--	--	--
Minnesota-Wisconsin	8,368	6,393	30	1,942	8,365	3	--	3
Exported[4/]	--	733	--	85	818	--	--	--
Total	11,941	10,699	30	2,027	12,756	3	--	3

(Table 1 continued on next page)

(Table 1 continued)

Species and destination	Total receipts[3]	Production by States[2]				Imports		
		Michigan	Minnesota	Wisconsin	Regional total	Other U.S.	Canada	Total imports
Paper birch								
Michigan	1,089	1,089	--	--	1,089	--	--	--
Minnesota-Wisconsin	387	104	56	175	335	--	52	52
Exported[4]	--	145	--	--	145	--	--	--
Total	1,476	1,338	56	175	1,569	--	52	52
Pecan								
Exported[4]	--	20	--	--	20	--	--	--
Total	--	20	--	--	20	--	--	--
Red oak								
Michigan	369	369	--	--	369	--	--	--
Minnesota-Wisconsin	9,380	468	1,450	5,930	7,848	1,324	208	1,532
Exported[4]	--	2,236	--	234	2,470	--	--	--
Total	9,749	3,073	1,450	6,164	10,687	1,324	208	1,532
Soft maple								
Michigan	306	306	--	--	306	--	--	--
Minnesota-Wisconsin	1,175	568	93	490	1,151	24	--	24
Total	1,481	874	93	490	1,457	24	--	24
Sycamore								
Exported[4]	--	23	--	--	23	--	--	--
Total	--	23	--	--	23	--	--	--
Walnut								
Michigan	114	114	--	--	114	--	--	--
Exported[4]	--	144	11	59	214	--	--	--
Total	114	258	11	59	328	--	--	--
White oak								
Michigan	1,638	1,638	--	--	1,638	--	--	--
Minnesota-Wisconsin	315	--	52	206	258	57	--	57
Exported[4]	--	1,739	2	10	1,751	--	--	--
Total	1,953	3,377	54	216	3,647	57	--	57
Yellow birch								
Michigan	2,478	2,478	--	--	2,478	--	--	--
Minnesota-Wisconsin	1,930	550	26	1,094	1,670	--	260	260
Exported[4]	--	--	--	3	3	--	--	--
Total	4,408	3,028	26	1,097	4,151	--	260	260
Other hardwoods								
Exported[4]	--	--	--	129	129	--	--	--
Total	--	--	--	129	129	--	--	--
All species								
Michigan	27,287	22,087	--	5,200	27,287	--	--	--
Minnesota-Wisconsin	31,449	9,029	5,982	14,331	29,342	1,587	520	2,107
Exported[4]	--	5,645	535	1,332	7,512	--	--	--
Total	58,736	36,761	6,517	20,863	64,141	1,587	520	2,107

[1] International 1/4-inch rule.

[2] Vertical columns of figures under box heading "Production by States" present the amount of veneer logs in each State.

[3] Production minus exports plus imports.

[4] Veneer logs shipped to States outside the Lake States and to Canada.

Table 2.--Veneer log production and receipts in the Lake States by species, 1976 and 1980

(In thousand board feet)[1/]

Species	Production			Receipts		
	1976	1980	Change	1976	1980	Change
Pine	402	240	-162	402	240	-162
Ash	965	831	-134	942	805	-137
Aspen	21,828	20,245	-1,583	21,460	19,958	-1,502
Basswood	2,069	2,072	3	2,254	2,100	-154
Beech	1,171	1,107	-64	994	1,050	56
Black cherry	245	229	-16	190	77	-113
Cottonwood	1,434	1,322	-112	1,434	1,254	-180
Elm	6,701	3,323	-3,378	6,344	2,130	-4,214
Hard maple	14,018	12,756	-1,262	12,390	11,941	-449
Paper birch	1,236	1,569	333	1,309	1,476	167
Red oak	11,836	10,687	-1,149	12,055	9,749	-2,306
Soft maple	1,049	1,457	408	1,359	1,481	122
Walnut	709	328	-381	0	114	114
White oak	707	3,647	2,940	98	1,953	1,855
Yellow birch	4,474	4,151	-323	4,614	4,408	-206
Other hardwoods	773	177	-596	463	0	-463
All species	69,617	64,141	-5,476	66,308	58,736	-7,572

[1/] International 1/4-inch rule.

Table 3.--Veneer log production by species group for selected years, Lake States, 1946-1980

(In million board feet)[1/]

Year	All species	Species group												
		Ash	Aspen	Bass-wood	Beech	Yellow birch	Cotton-wood	Elm	Hard maple	Soft maple	Red oak	White oak	Paper birch	Walnut	Other species
1946	110.6	2.3	4.0	10.4	5.6	[2/]26.8	0.4	16.6	[3/]40.3	--	[4/]3.1	--	--	--	1.1
1952	78.2	--	1.4	10.4	3.1	[2/]18.2	--	11.5	[3/]23.8	--	[4/]5.1	--	--	--	[5/]4.7
1954	72.0	.8	.3	9.2	3.2	[2/]17.3	2.7	10.5	[3/]20.9	--	[4/]5.5	--	--	--	1.6
1956	79.0	.7	.8	10.3	5.7	[2/]20.3	2.1	9.6	20.1	3.7	[4/]4.5	--	--	0.3	.9
1958	52.7	.6	1.7	7.1	1.8	[2/]13.1	2.2	8.9	9.7	2.2	[4/]4.8	--	--	.2	.4
1960	54.0	1.0	2.1	6.2	1.0	[2/]14.1	1.9	5.1	10.9	2.9	[4/]7.6	--	--	.6	.6
1963	50.5	.6	1.5	6.6	.3	[2/]10.9	.4	5.7	10.5	2.2	[4/]8.9	--	--	2.3	.6
1965	51.7	.7	.6	6.0	.5	[2/]11.3	1.4	6.3	11.8	1.8	[4/]9.0	--	--	.9	1.4
1966	50.9	1.1	.7	4.5	.5	[2/] 9.5	1.4	5.7	13.1	1.5	9.1	0.3	--	1.5	2.0
1968	45.5	1.0	.6	3.6	.5	8.3	1.4	5.4	9.4	1.2	8.2	.5	1.9	1.7	1.8
1970	34.4	.4	1.3	3.2	.3	4.4	1.3	3.8	8.8	.8	6.8	.3	1.2	.6	1.2
1972	42.2	.6	2.6	2.9	1.1	5.2	1.3	5.1	9.2	1.0	9.7	.3	1.2	1.4	.6
1974	68.7	.9	24.2	2.4	.7	4.2	1.8	6.1	11.7	2.0	11.1	.6	1.3	1.0	.7
1976	69.6	1.0	21.8	2.1	1.2	4.5	1.4	6.7	14.0	1.1	11.8	.7	1.2	.7	1.4
1980	64.1	0.8	20.2	2.1	1.1	4.2	1.3	3.3	12.8	1.5	10.7	3.6	1.6	.3	.6

[1/] International 1/4-inch rule.

[2/] Includes paper birch.

[3/] Includes soft maple.

[4/] Includes white oak.

[5/] Includes ash and cottonwood.

Table 4.--Lake States veneer log production, receipts, exports and imports for selected years, 1946-1980

(In million board feet)[1/]

Year	Produced in the Lake States and received at Lake States mills	Exported[2/]	Imported[3/]	Total production in Lake States	Total receipts in Lake States
1946	109.7	0.9	5.9	110.6	115.6
1948	116.0	.8	12.0	116.8	128.0
1950	86.0	.6	15.7	86.6	101.7
1952	77.8	.4	12.1	78.2	89.9
1954	71.6	.4	12.1	72.0	83.7
1956	78.7	.3	13.4	79.0	92.1
1958	51.5	1.2	6.0	52.7	57.5
1960	51.9	2.1	12.5	54.0	64.4
1963	45.0	5.5	7.7	50.5	52.7
1965	49.0	2.7	7.6	51.7	56.6
1966	45.8	5.1	9.6	50.9	55.4
1968	39.7	5.8	7.9	45.5	47.6
1970	31.4	3.0	5.6	34.4	37.0
1972	37.7	4.5	4.6	42.2	42.3
1974	63.4	5.3	4.1	68.7	67.5
1976	63.3	6.3	3.0	69.6	66.3
1980	56.6	7.5	2.1	64.1	58.7

[1/] International 1/4-inch rule.

[2/] From Lake States to other States and Canada

[3/] From other States and Canada into Lake States.

Table 5.--Veneer log receipts in the Lake States by species group for selected years, 1952-1980

(In million board feet)[1/]

Year	All species	Species group												
		Ash	Aspen	Bass-wood	Beech	Yellow birch	Cotton-wood	Elm	Hard maple	Soft maple	Red oak	White oak	Paper birch	Other species
1952	89.9	--	1.4	10.9	3.2	[2/]27.1	--	11.7	[3/]24.9	--	[4/]5.3	--	--	[5/]5.4
1954	83.7	0.8	.3	10.3	3.2	[2/]25.0	2.7	10.9	[3/]22.4	--	[4/]6.5	--	--	1.6
1956	92.1	.7	.8	10.6	5.7	[2/]28.5	3.0	10.2	21.9	4.7	[4/]5.0	--	--	1.0
1958	57.5	.6	1.7	7.3	1.8	[2/]17.2	2.2	9.2	9.6	2.5	[4/]5.0	--	--	.4
1960	64.4	1.1	2.1	6.8	.9	[2/]18.9	3.3	6.2	12.2	3.6	[4/]8.4	--	--	.9
1963	52.7	.7	1.6	6.7	.3	[2/]14.3	.7	4.9	11.1	2.6	[4/]9.3	--	--	.5
1965	56.6	.7	.6	6.3	.5	[2/]14.5	2.1	6.3	13.2	1.9	[4/]9.3	--	--	1.2
1966	55.4	1.1	.7	4.8	.5	[2/]14.7	2.3	5.8	12.8	1.8	9.7	.2	--	1.0
1968	47.6	1.0	.6	3.9	.5	10.2	2.1	5.2	9.0	1.3	8.3	.2	4.0	1.3
1970	37.0	.3	1.3	3.6	.3	6.1	1.4	3.8	9.0	.9	7.7	.2	1.9	.5
1972	42.3	.6	2.4	3.1	.7	6.3	1.3	5.3	9.4	1.2	10.1	.2	1.5	.2
1974	67.5	.9	24.3	2.6	.5	4.6	1.8	5.7	11.9	2.3	11.1	.1	1.3	.4
1976	66.3	.9	21.5	2.2	1.0	4.6	1.4	6.3	12.4	1.4	12.1	.1	1.3	1.1
1980	58.7	.8	20.0	2.1	1.0	4.4	1.3	2.1	11.9	1.5	9.7	2.0	1.5	.4

[1/] International 1/4-inch rule.

[2/] Includes paper birch.

[3/] Includes soft maple.

[4/] Includes white oak.

[5/] Includes ash and cottonwood.

Table 6.--Percent of veneer log production and receipts by species group, Lake States, 1956 and 1980

(In percent)

Species group	Production		Receipts	
	1956	1980	1956	1980
Ash	0.9	1.3	0.8	1.4
Aspen	1.0	31.5	0.9	34.0
Basswood	13.0	3.3	11.5	3.6
Beech	7.2	1.7	6.2	1.7
Birch	25.7	9.1	30.9	10.0
Cottonwood	2.7	2.0	3.2	2.2
Elm	12.2	5.1	11.1	3.6
Hard maple	25.4	20.0	23.8	20.3
Soft maple	4.7	2.3	5.1	2.6
Oak	5.7	22.3	5.4	19.9
Other species	1.5	1.4	1.1	0.7
All species	100.0	100.0	100.0	100.0

Table 7.--Production and disposition of softwood and hardwood veneer mill residue by type of residue and use, Lake States, 1980

(In thousand tons green weight)

State and type of use	Wood residue						Bark	
	Total		Coarse[1]		Fine[2]			
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Wisconsin								
Fiber products	--	5.32	--	3.16	--	2.16	--	--
Industrial fuel	0.49	48.71	0.19	16.53	0.30	32.18	0.14	15.74
Domestic fuel	--	.08	--	.08	--	--	--	--
Miscellaneous[3]	--	2.03	--	1.80	--	.23	--	.03
Not used[4]	--	.02	--	.01	--	.01	--	.01
Total	.49	56.16	.19	21.58	.30	34.58	.14	15.78
Minnesota								
Industrial fuel	--	6.95	--	2.64	--	4.31	--	1.99
Domestic fuel	--	.11	--	.11	--	--	--	--
Miscellaneous[3]	--	.07	--	.02	--	.05	--	--
Not used[4]	--	.08	--	--	--	.08	--	.04
Total	--	7.21	--	2.77	--	4.44	--	2.03
Michigan								
Fiber products	--	12.17	--	12.17	--	--	--	--
Industrial fuel	--	35.15	--	5.61	--	29.54	--	14.05
Domestic fuel	--	3.85	--	2.94	--	.91	--	--
Miscellaneous[3]	--	3.82	--	.15	--	3.67	--	1.49
Not used[4]	--	.40	--	.40	--	--	--	--
Total	--	55.39	--	21.27	--	34.12	--	15.54
All Lake States								
Fiber products	--	17.49	--	15.33	--	2.16	--	--
Industrial fuel	.49	90.81	.19	24.78	.30	66.03	.14	31.78
Domestic fuel	--	4.04	--	3.13	--	.91	--	--
Miscellaneous[3]	--	5.92	--	1.97	--	3.95	--	1.52
Not used[4]	--	.50	--	.41	--	.09	--	.05
Total	.49	118.76	.19	45.62	.30	73.14	.14	33.35

[1] Suitable for chipping, such as veneer cores.

[2] Not suitable for chipping, such as veneer clippings.

[3] Livestock bedding, mulch, small dimension, and specialty items.

[4] Includes residue burned as waste.

Table 8.--Production and imports of veneer logs, Central States, 1980

(In thousand board feet)[1/]

Species and destination	Total receipts[3/]	Production by States[2/]					Imports		
		Illinois	Indiana	Iowa	Missouri	Regional total	Lake States	Other U.S.	T im
Pine									
Indiana	373	--	--	--	--	--	--	373	37
Total	373	--	--	--	--	--	--	373	37
Ash									
Indiana	500	113	280	--	--	393	8	99	10
Illinois-Iowa-Missouri	7	7	--	--	--	7	--	--	
Exported[4/]	--	28	21	57	--	106	--	--	
Total	507	148	301	57	--	506	8	99	10
Basswood									
Indiana	7	--	7	--	--	7	--	--	
Exported[4/]	--	--	9	84	--	93	--	--	
Total	7	--	16	84	--	100	--	--	
Beech									
Exported[4/]	--	--	40	--	--	40	--	--	
Total	--	--	40	--	--	40	--	--	
Black cherry									
Indiana	968	--	20	--	--	20	49	899	9
Illinois-Iowa-Missouri	32	32	--	--	--	32	--	--	
Exported[4/]	--	--	24	--	--	24	--	--	
Total	1,000	32	44	--	--	76	49	899	9
Butternut									
Indiana	5	--	--	--	--	--	5	--	
Total	5	--	--	--	--	--	5	--	
Cottonwood									
Indiana	590	--	431	--	--	431	68	91	1
Illinois-Iowa-Missouri	1,072	--	--	--	1,072	1,072	--	--	
Exported[4/]	--	--	--	23	--	23	--	--	
Total	1,662	--	431	23	1,072	1,526	68	91	1
Elm									
Indiana	313	1	33	--	--	34	261	18	2
Illinois-Iowa-Missouri	383	--	--	--	--	--	383	--	3
Exported[4/]	--	10	8	--	--	18	--	--	
Total	696	11	41	--	--	52	644	18	6
Gum									
Indiana	254	9	226	--	--	235	--	19	
Total	254	9	226	--	--	235	--	19	
Hard maple									
Indiana	566	--	201	11	--	212	252	102	3
Illinois-Iowa-Missouri	49	--	--	--	--	--	49	--	
Exported[4/]	--	--	34	3	--	37	--	--	
Total	615	--	235	14	--	249	301	102	4
Pecan									
Indiana	3,401	115	337	--	94	546	11	2,844	3
Illinois-Iowa-Missouri	3	3	--	--	--	3	--	--	
Exported[4/]	--	--	17	--	--	17	--	--	
Total	3,404	118	354	--	94	566	11	2,844	3

(Table 8 continued on nex

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ies and ination	Total receipts[3]	Production by States[2]					Imports		
		Illinois	Indiana	Iowa	Missouri	Regional total	Lake States	Other U.S.	Total imports
oak									
ndiana	4,070	23	1,217	216	--	1,456	1,158	1,456	2,614
llinois-Iowa-Missouri	290	128	--	162	--	290	--	--	--
xported[4]	--	570	348	754	--	1,672	--	--	--
Total	4,360	721	1,565	1,132	--	3,418	1,158	1,456	2,614
maple									
diana	238	34	168	--	--	202	--	36	36
ported[4]	--	--	--	24	--	24	--	--	--
Total	238	34	168	24	--	226	--	36	36
more									
diana	236	--	145	--	--	145	--	91	91
inois-Iowa-Missouri	57	--	--	--	57	57	--	--	--
ported[4]	--	--	68	--	--	68	--	--	--
Total	293	--	213	--	57	270	--	91	91
it									
diana	3,861	908	1,024	562	555	3,049	125	687	812
inois-Iowa-Missouri	2,040	30	--	1,193	498	1,721	--	319	319
ported[4]	--	68	205	38	23	334	--	--	--
Total	5,901	1,006	1,229	1,793	1,076	5,104	125	1,006	1,131
oak									
diana	11,000	1,579	4,180	514	147	6,420	137	4,443	4,580
inois-Iowa-Missouri	1,583	253	391	103	827	1,574	--	9	9
ported[4]	--	70	462	56	--	588	--	--	--
Total	12,583	1,902	5,033	673	974	8,582	137	4,452	4,589
w poplar									
diana	957	--	825	--	--	825	--	132	132
Total	957	--	825	--	--	825	--	132	132
hardwoods									
iana	59	25	16	--	2	43	--	16	16
inois-Iowa-Missouri	1	1	--	--	--	1	--	--	--
Total	60	26	16	--	2	44	--	16	16
pecies									
iana	27,398	2,807	9,110	1,303	798	14,018	2,074	11,306	13,380
inois-Iowa-Missouri	5,517	454	391	1,458	2,454	4,757	432	328	760
orted[4]	--	746	1,236	1,039	23	3,044	--	--	--
otal	32,915	4,007	10,737	3,800	3,275	21,819	2,506	11,634	14,140

[1] International 1/4-inch rule

[2] Vertical columns of figures under box heading "Production by States" present the amount of veneer logs cut in State.

[3] Production minus exports plus imports.

[4] Veneer logs shipped to States outside the Central States and to Canada.

Table 9.--Veneer log production and receipts in the Central States by species, 1976 and 1980

(In thousand board feet)[1/]

Species	Production			Receipts		
	1976	1980	Change	1976	1980	Change
Pine	--	--	--	263	373	110
Ash	979	506	-473	1,236	507	-729
Basswood	316	100	-216	43	7	-36
Black cherry	135	76	-59	660	1,000	340
Cottonwood	2,264	1,526	-738	2,584	1,662	-922
Elm	42	52	10	221	696	475
Gum	417	235	-182	432	254	-178
Hard maple	400	249	-151	1,364	615	-749
Pecan (hickory)	975	566	-409	4,293	3,404	-889
Red oak	3,797	3,418	-379	3,068	4,360	1,292
Soft maple	875	226	-649	560	238	-322
Sycamore	614	270	-344	651	293	-358
Walnut	7,554	5,104	-2,450	8,264	5,901	-2,363
White oak	7,691	8,582	891	10,821	12,583	1,762
Yellow-poplar	1,293	825	-468	1,393	957	-436
Other hardwoods	39	84	45	235	65	-170
All species	27,391	21,819	-5,572	36,088	32,915	-3,173

[1/]International 1/4-inch rule.

Table 10.--Veneer log production by species group for selected years, Central States, 1956-1980

(In million board feet)[1/]

Year	All species	Species group										
		Cotton-wood	Elm	Hard maple	Pecan (hickory)	Red oak	Soft maple	Syca-more	Walnut	White oak	Yellow-poplar	Other specie
1956	33.1	8.0	0.9	0.8	0.1	1.1	1.8	0.6	10.6	3.4	1.6	4.2
1958	32.4	8.9	.6	1.1	.1	1.0	.5	.5	10.8	2.6	1.1	5.2
1960	39.9	11.2	2.0	1.2	.1	1.5	1.2	2.5	13.2	1.6	1.6	3.8
1963	38.0	7.4	.7	1.6	.8	.9	1.0	1.8	15.5	1.4	2.3	4.6
1966	36.7	6.2	[2/].7	1.4	1.1	2.3	.5	1.0	14.7	1.9	3.0	3.9
1968	37.0	4.1	.7	1.3	3.0	2.1	.4	1.2	16.1	3.6	1.3	3.2
1970	23.5	4.8	.6	.8	1.5	1.3	.5	1.3	8.1	1.7	.8	2.1
1972	26.2	3.5	.5	1.1	2.4	1.7	.4	.7	10.0	3.3	1.2	1.4
1974	29.1	4.0	.7	1.1	1.2	2.9	.6	.9	8.5	5.2	1.2	2.8
1976	27.4	2.3	[3/]	.4	1.0	3.8	.9	.6	7.5	7.7	1.3	1.9
1980	21.8	1.5	.1	.2	.6	3.4	.2	.3	5.1	8.6	.8	1.0

[1/]International 1/4-inch rule.

[2/]Estimated.

[3/]Less than 50 thousand board feet.

Table 11.--Veneer log receipts by species group for selected years, Central States, 1956-1980

(In million board feet)[1/]

r	All species	Species group: Cotton-wood	Elm	Hard maple	Pecan (hickory)	Red oak	Soft maple	Syca-more	Walnut	White oak	Yellow-poplar	Other species
6	44.4	10.9	0.8	1.2	0.6	1.3	0.8	1.3	11.4	6.7	2.8	6.6
8	41.6	10.2	.6	1.7	.3	1.3	.3	1.2	13.0	4.8	1.9	6.3
0	50.2	10.4	1.0	2.9	.2	1.4	.5	2.3	17.1	3.6	2.8	8.0
3	52.2	8.6	1.0	3.1	1.6	.9	.8	2.0	21.2	2.3	2.8	7.9
6	48.2	6.7	[2/]1.0	3.6	1.6	2.0	.4	1.2	17.9	2.1	4.4	7.3
8	48.8	5.7	1.0	2.7	4.9	2.3	.5	1.1	18.4	5.2	1.9	5.1
0	28.0	4.7	.5	1.3	3.0	.8	.6	1.4	10.0	2.0	1.1	2.6
2	35.1	4.9	.3	2.4	5.7	1.6	.5	.9	11.0	4.0	1.2	2.6
4	39.7	5.6	.7	1.3	3.6	3.8	.7	1.0	10.1	7.7	1.3	3.9
6	36.1	2.6	.2	1.4	4.3	3.1	.5	.6	8.3	10.8	1.4	2.9
0	32.9	1.7	.7	.6	3.4	4.4	.2	.3	5.9	12.6	.9	2.2

[1/] International 1/4-inch rule.

[2/] Estimated.

Table 12.--Percent of veneer log production and receipts by species group, Central States, 1956 and 1980

(In percent)

Species group	Production		Receipts	
	1956	1980	1956	1980
Cottonwood	24.2	6.9	24.5	5.2
Elm	2.7	0.5	1.8	2.1
Hard maple	2.4	0.9	2.7	1.8
Pecan (hickory)	0.3	2.7	1.4	10.4
Red oak	3.3	15.6	2.9	13.4
Soft maple	5.5	0.9	1.8	0.6
Sycamore	1.8	1.4	2.9	0.9
Walnut	32.0	23.4	25.7	17.9
White oak	10.3	39.4	15.1	38.3
Yellow-poplar	4.8	3.7	6.3	2.7
Other species	12.7	4.6	14.9	6.7
All species	100.0	100.0	100.0	100.0

Table 13.--Production and disposition of softwood and hardwood veneer mill residue by type of residue and use, Central States, 1980

(In thousand tons green weight)

State and type of use	Wood residue							
	Total		Coarse[1]		Fine[2]		Bark	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Indiana								
Fiber products	--	3.30	--	3.30	--	--	--	--
Industrial fuel	0.76	47.52	0.29	16.48	0.47	31.04	0.21	13.53
Domestic fuel	--	1.22	--	.05	--	1.17	--	--
Miscellaneous[3]	--	2.50	--	1.24	--	1.26	--	1.68
Not used[4]	--	.31	--	--	--	.31	--	.21
Total	.76	54.85	.29	21.07	.47	33.78	.21	15.42
Illinois-Iowa-Missouri								
Fiber products	--	1.41	--	1.41	--	--	--	--
Industrial fuel	--	5.30	--	1.63	--	3.67	--	1.70
Domestic fuel	--	1.25	--	1.25	--	--	--	.10
Miscellaneous[3]	--	.04	--	--	--	.04	--	.39
Not used[4]	--	3.18	--	--	--	3.18	--	.97
Total	--	11.18	--	4.29	--	6.89	--	3.16
All States								
Fiber products	--	4.71	--	4.71	--	--	--	--
Industrial fuel	.76	52.82	.29	18.11	.47	34.71	.21	15.23
Domestic fuel	--	2.47	--	1.30	--	1.17	--	.10
Miscellaneous[3]	--	2.54	--	1.24	--	1.30	--	2.07
Not used[4]	--	3.49	--	--	--	3.49	--	1.18
Total	.76	66.03	.29	25.36	.47	40.67	.21	18.58

[1] Suitable for chipping such as veneer cores.

[2] Not suitable for chipping such as veneer clippings.

[3] Livestock bedding, mulch, small dimension, and speciality items.

[4] Includes residue burned as waste.

Blyth, James E.; Smith, W. Brad.
Veneer industry and timber use, North Central Region, 1980. Resour. Bull. NC-76. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1984. 16 p.

Shows 1980 veneer-log production and receipts by species in the Lake States (Michigan, Minnesota, and Wisconsin) and in the Central States (Illinois, Indiana, Iowa, and Missouri). Comparisons are made with similar data collected in 1976. Includes tables showing veneer-log production and receipts (for selected years) since 1946 in the Lake States and since 1956 in the Central States.

KEY WORDS: Imports, exports, veneer mills, wood residue, bark.

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Resource Bulletin **NC-77**

Primary Forest Products Industry and Timber Use, Kansas, 1980

James E. Blyth, Leonard K. Gould, and W. Brad Smith

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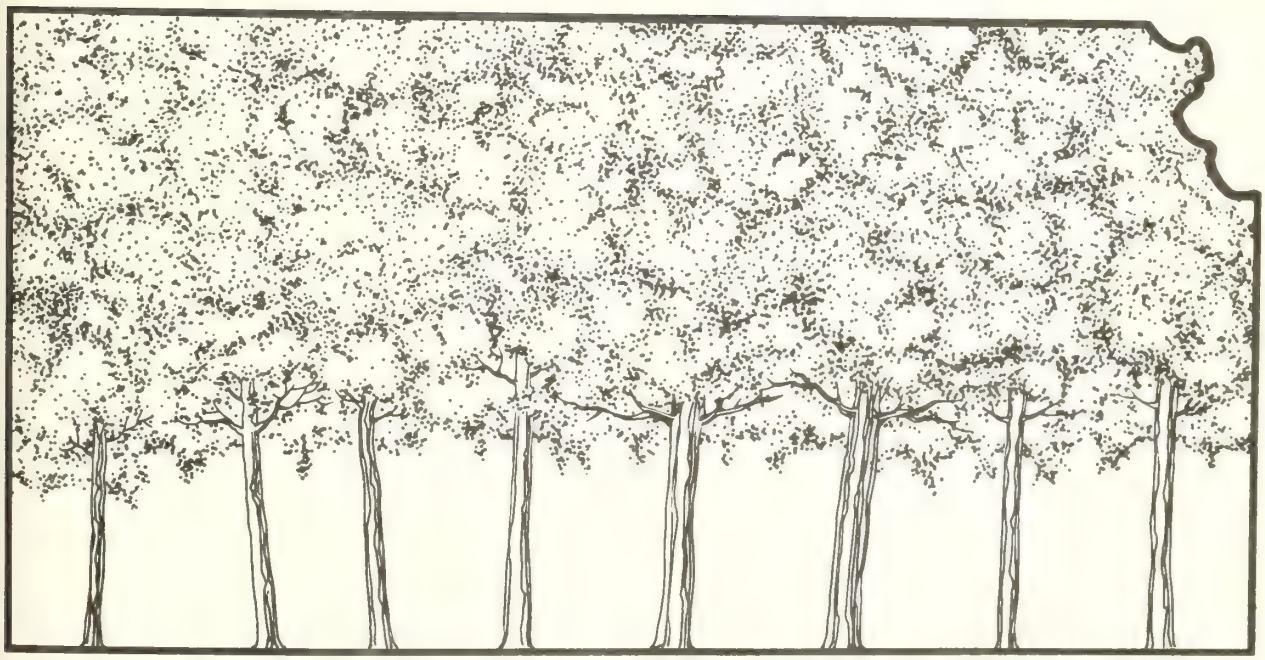

FOREWORD

This Bulletin contains the results of a detailed study of forest industry, timber products output from roundwood, and associated primary mill wood and bark residue in Kansas in 1980. Such detailed information is necessary for intelligent planning and decisionmaking in wood procurement, forest resource management, and forest industry development. Likewise, researchers need current forest industry and timber products output information to plan projects.

Special thanks are given to the primary wood-using firms that supplied information for this study. Their cooperation is greatly appreciated.

Quantities shown may vary slightly from one table to another because of rounding differences, but these differences are insignificant.

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North Central Forest Experiment Station
Forest Service—U.S. Department of Agriculture
1992 Folwell Avenue
St. Paul, Minnesota 55108
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PRIMARY FOREST PRODUCTS INDUSTRY AND TIMBER USE, KANSAS, 1980

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HIGHLIGHTS

- The number of active primary wood-using mills declined from 95 in 1964 to 63 in 1980. All of the net loss in mills was in the two eastern Forest Survey Units (fig. 1). In the Western Unit, active mills rose from 8 to 14.
- Timber products output (TPO) from roundwood climbed 182 percent between 1964 and 1980 to 23.3 million cubic feet. Major harvest gains were in white oak, red oak, ash, hackberry, and cottonwood. These species, along with walnut, were the principal species harvested and provided 70 percent of the roundwood cut in 1980.
- Average annual lumber production at sawmills increased. Between 1964 and 1980, the number of medium-size sawmills rose from 6 to 11 while the number of small sawmills dropped from 73 to 48.
- Loggers harvested more than 10 million cubic feet of timber products in each of the two eastern Units, accounting for 87 percent of the State's roundwood harvest.
- Estimated fuelwood production from roundwood was 255,000 cords and constituted 77 percent of the TPO from roundwood. Fuelwood production from roundwood in 1980 was 3.75 times greater than fuelwood cut in 1964.
- Saw log production in 1980 was 31.9 million board feet, nearly double the output in 1964 and 39 percent above 1969 production. Demand for oak grew rapidly since 1969. Leading species cut were walnut and cottonwood.
- Elm losses to Dutch Elm disease during the 1970's led to a 53 percent drop in elm saw log production between 1969 and 1980.
- Most of the saw log production is processed in Kansas. Only 1.4 million board feet was exported, primarily to Missouri. The Southeastern Unit led in production (16.8 million board feet).
- Counties each producing more than 1 million board feet of saw logs were (in order of importance) Neosho, Labette, Allen, Woodson, Douglas, Bourbon, Shawnee, Montgomery, Franklin, and Leavenworth. These counties provided 49 percent of the Kansas saw log harvest.
- Five counties—Douglas, Franklin, Jefferson, Miami, and Linn—each cut more than 0.5 million board feet of walnut saw logs.
- Kansas sawmills received 35.6 million board feet of logs in 1980. Missouri supplied 3.2 million board feet and another 1.9 million board feet was supplied in nearly equal divisions from Nebraska, Oklahoma, and Iowa. Kansas sawmills imported more than one-third (36 percent) of their walnut log requirements in 1980.
- Sawmills in the Northeastern Unit received 52 percent of the total saw log receipts in Kansas. Northeastern Unit sawmills sawed more than 90 percent of the walnut saw logs received by Kansas mills.
- Ninety percent of the imported saw log volume (including all of the imported walnut) was shipped to Northeastern Unit mills.
- An estimated 350,000 posts were cut in Kansas, about 64 percent of the 1964 level. Osage orange was the preferred species.
- During 1980, on a green weight basis, Kansas primary wood-using mills generated 47,000 tons of coarse (chippable) wood residue, 28,000 tons of fine wood residue, and 20,000 tons of bark. Fuel was the dominant use for bark; 42 percent of the bark was not used for any purpose.
- Great progress has been made since 1964 in finding uses for wood residue generated at primary wood-using mills. Seventy-six percent of the coarse residue was used in 1980 compared with 19 percent in 1964. Three-fourths of the fine residue was used

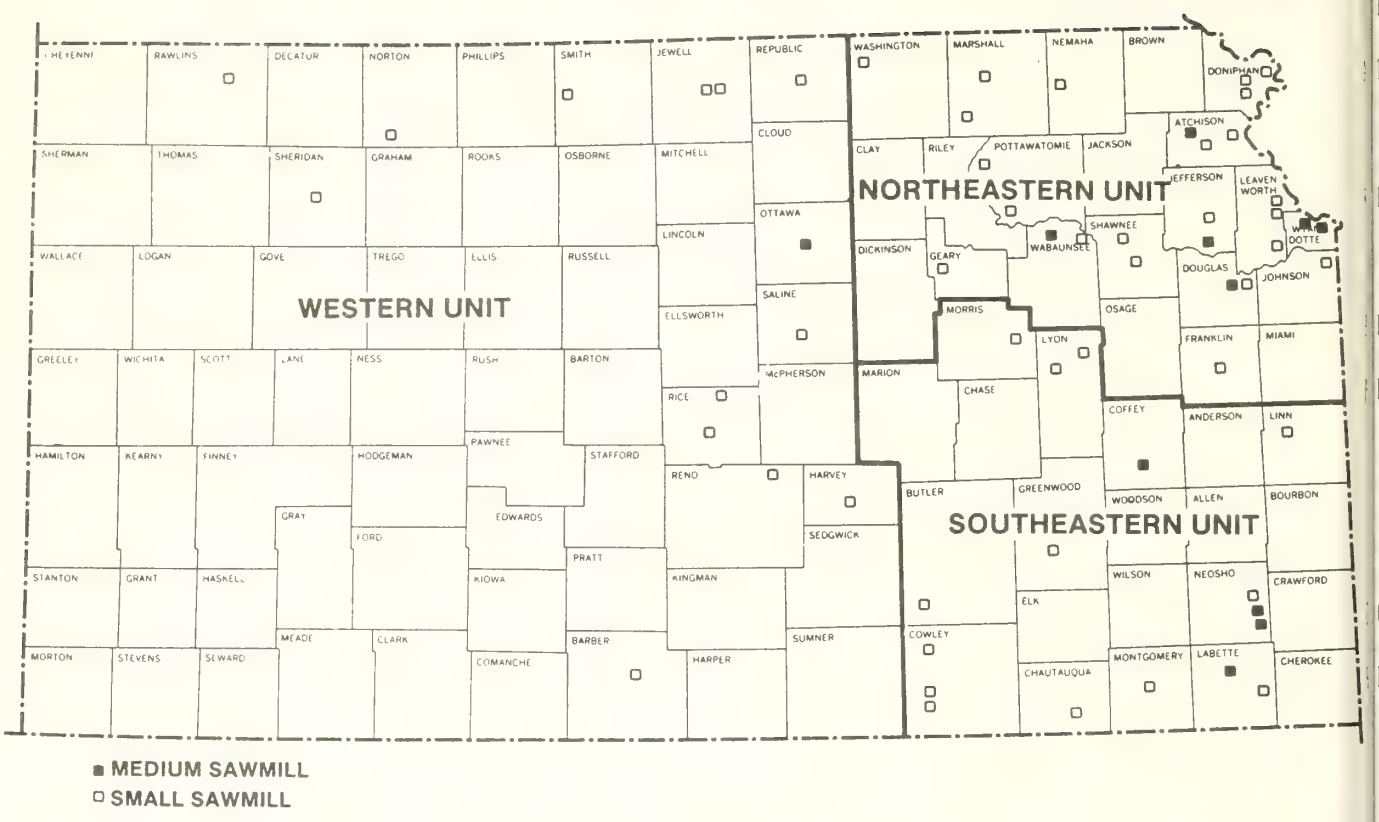

Figure 1.—*Active sawmills and Forest Survey Units in Kansas, 1980. Sawmills are classed by volume of lumber produced in 1980: medium = 1 to 5 million board feet; small = less than 1 million board feet. Forest Survey Units are the geographic areas used by the Forest Inventory and Analysis Project to report periodic inventories and use of the Nations's forest resources.*

in 1980, up from 48 percent in 1964. Chief uses for coarse residue were for fuel and fiber products. Major uses for fine residue were as fuel, poultry litter, livestock bedding, mulch, etc.

APPENDIX

STUDY METHODS

Except for fuelwood and posts, data for this publication came from canvassing with a formal questionnaire all of the known primary wood-using mills that use Kansas logs and bolts. All canvassing in Kansas was initially done by mail by the Kansas Cooperative Extension Service, State and Extension Forestry (KCES); follow-up on nonrespondents was by mail, telephone, and personal contact. For a few Kansas mills that did not furnish complete data, KCES utilization and marketing specialists provided estimates based on prior knowledge and contacts. Similar cooperative studies in other North Central States by the North Central Forest Experiment Station and State forest agencies provided data from out-of-State mills that used Kansas logs and bolts.

General offices of railroads serving Kansas were solicited by the Station to determine the volume of veneer logs shipped from points in Kansas to seaports for export overseas.

Estimates of 1980 fuelwood and post production in Kansas were made by the KCES based on recent production studies, records, and discussions with others knowledgeable about these products.

The Station edited and compiled the data.

SAMPLING ERROR

Because all primary wood-using mills were canvassed, there is no sampling error for the roundwood products they use.

DEFINITION OF TERMS

Roundwood.—Logs, bolts, or other round sections cut from trees (including chips from roundwood).

Timber products output from roundwood.—Logs and bolts (including chips from roundwood) harvested for saw logs, veneer logs, cooperage logs, pulpwood, posts, fuelwood, and other products.

Forest Survey Unit.— A geographical area (group of counties) used by the Forest Inventory and Analysis Project to report periodic inventories and use of the Nation's forest resources.

Primary wood-using mills.—Mills using roundwood products (including chips from roundwood).

Primary wood-using mill residue.—Wood materials (coarse and fine) and bark not utilized for principal products at mills using roundwood. These residues include wood products (byproducts) obtained incidental to production of principal products and wood materials not utilized for some product.

Coarse mill residue.—Wood residue suitable for chipping such as slabs, edgings, and veneer cores.

Fine mill residue.—Wood residue not suitable for chipping such as sawdust and veneer clippings.

COMMON AND SCIENTIFIC NAMES OF TREE SPECIES IN KANSAS

SOFTWOODS
- Redcedar (eastern) ..... *Juniperus virginiana*

HARDWOODS
- Ash (green) ..... *Fraxinus pennsylvanica*
- Basswood(American) ..... *Tilia americana*
- Birch (river) ..... *Betula nigra*
- Boxelder ..... *Acer negundo*
- Cherry (black) ..... *Prunus serotina*
- Catalpa (northern) ..... *Catalpa speciosa*
- Cottonwood(eastern) ..... *Populus deltoides*
- Elm
  - American elm ..... *Ulmus americana*
  - Rock elm ..... *Ulmus thomasii*
  - Siberian elm ..... *Ulmus pumila*
  - Slippery elm ..... *Ulmus rubra*
- Hackberry ..... *Celtis occidentalis*
- Hickory
  - Bitternut hickory ..... *Carya cordiformis*
  - Mockernut hickory ..... *Carya tomentosa*
  - Pecan ..... *Carya illinoensis*
  - Pignut hickory ..... *Carya glabra*
  - Shagbark hickory ..... *Carya ovata*
  - Shellbark hickory ..... *Carya laciniosa*
- Honeylocust ..... *Gleditsia triacanthos*
- Kentucky coffeetree ..... *Gymnocladus dioicus*
- Locust (black) ..... *Robinia pseudoacacia*
- Maple
  - Hard maple
    - Black maple ..... *Acer nigrum*
    - Sugar maple ..... *Acer saccharum*
  - Soft maple
    - Red maple ..... *Acer rubrum* var. *rubrum*
    - Silver maple ..... *Acer saccharinum*
- Mulberry
  - Red mulberry ..... *Morus rubra*
  - White mulberry ..... *Morus alba*
- Oak
  - Select red oaks
    - Northern red oak ..... *Quercus rubra*
    - Shumard oak ..... *Quercus shumardii*
  - Other red oaks
    - Black oak ..... *Quercus velutina*
    - Pin oak ..... *Quercus palustris*
    - Shingle oak ..... *Quercus imbricaria*
  - Select white oaks
    - Bur oak ..... *Quercus macrocarpa*
    - Chinkapin oak ..... *Quercus muehlenbergii*
    - White oak ..... *Quercus alba*
  - Other white oaks
    - Post oak ..... *Quercus stellata* var. *stellata*
- Persimmon (common) ..... *Diospyros virginiana*
- Sycamore (American) ..... *Platanus occidentalis*
- Walnut (Black) ..... *Juglans nigra*
- Willow (black) ..... *Salix nigra*

Table 1.--Timber products output from roundwood by species and product, Kansas, 1980

Species	All products	Saw logs		Fuelwood		Posts		Veneer logs		Cooperage logs	
	MCF[1]	MBF[2]	MCF[1]	Cords[3]	MCF[1]	M pieces[4]	MCF[1]	MBF[2]	MCF[1]	MBF[2]	MCF[1]
Softwoods											
Eastern redcedar	92	321	66	--	--	35	26	--	--	--	--
Total	92	321	66	--	--	35	26	--	--	--	--
Hardwoods											
Ash	2,685	2,183	367	33,150	2,318	--	--	--	--	--	--
Basswood	18	10	1	250	17	--	--	--	--	--	--
Birch	9	58	9	--	--	--	--	--	--	--	--
Black cherry	3	18	3	--	--	--	--	--	--	--	--
Cottonwood	1,832	6,107	940	12,750	892	--	--	--	--	--	--
Elm	1,116	1,458	222	12,750	894	--	--	--	--	--	--
Hackberry	1,931	3,193	504	20,400	1,427	--	--	--	--	--	--
Pecan	57	348	57	--	--	--	--	--	--	--	--
Other hickory	545	74	11	7,650	534	--	--	--	--	--	--
Hard maple	25	--	--	400	25	--	--	--	--	--	--
Soft maple	779	1,543	246	7,650	533	--	--	--	--	--	--
Red oak	3,645	2,931	521	44,427	3,111	27	13	--	--	--	--
White oak	4,669	3,225	569	57,573	4,030	26	14	59	12	264	44
Sycamore	397	1,417	218	2,550	179	--	--	--	--	--	--
Walnut	1,609	8,955	1,362	2,550	178	--	--	478	69	--	--
Osage-orange	796	--	--	9,500	665	227	131	--	--	--	--
Other hardwoods	3,065	45	6	43,400	3,040	35	19	--	--	--	--
Total	23,181	31,565	5,036	255,000	17,843	315	177	537	81	264	44
All species	23,273	31,886	5,102	255,000	17,843	350	203	537	81	264	44

[1] Thousand cubic feet.

[2] Thousand board feet, International 1/4-inch rule.

[3] Standard cords.

[4] Thousand pieces.

Table 2.--Timber products output from roundwood by species, Kansas, 1964 and 1980

(In thousand cubic feet)

Species	1964	1980	Change
Softwoods			
Eastern redcedar	27	92	65
Total	27	92	65
Hardwoods			
Ash	770	2,685	1,915
Basswood	3	18	15
Black cherry	--	3	3
Cottonwood	517	1,832	1,315
Elm	376	1,116	740
Hackberry	345	1,931	1,586
Pecan	--	57	57
Other hickory	1060	545	-515
Hard maple	--	25	25
Soft maple	987	779	-208
Red oak	869	3,645	2,776
White oak	1,882	4,669	2,787
Sycamore	130	397	267
Walnut	1,112	1,609	497
Other hardwoods	169	3,870	3,701
Total	8,220	23,181	14,961
All species	8,247	23,273	15,026

Table 3.--Number of active primary wood-using mills by Unit, Kansas, 1964 and 1980

	All Units		Northeastern		Southeastern		Western	
Kind of mill	1964	1980	1964	1980	1964	1980	1964	1980
Sawmills								
Small[1/]	73	48	35	22	31	13	7	13
Medium[2/]	6	11	4	6	2	4	--	1
Cooperage mills	10	1	3	1	6	--	1	--
Charcoal plants	1	--	--	--	1	--	--	--
Miscellaneous plants[3/]	5	3	1	--	4	3	--	--
Total	95	63	43	29	44	20	8	14

[1/] Annual lumber output less than 1 million board feet.

[2/] Annual lumber output from 1 to 5 million board feet.

[3/] Fence post concentration yards and treating plants.

Table 4.--Timber products output from roundwood by species and Unit, Kansas, 1980

(In thousand cubic feet)

Species	All Units	Northeastern Unit	Southeastern Unit	Western Unit
Softwoods				
Eastern redcedar	92	44	13	35
Total	92	44	13	35
Hardwoods				
Ash	2,685	715	1,478	492
Basswood	18	18	--	--
Birch	9	9	--	--
Black cherry	3	3	--	--
Cottonwood	1,832	779	543	510
Elm	1,116	491	501	124
Hackberry	1,931	756	984	191
Pecan	57	--	57	--
Other hickory	545	349	196	--
Hard maple	25	--	25	--
Soft maple	779	372	403	4
Red oak	3,645	1,841	1,783	21
White oak	4,669	2,100	1,904	665
Sycamore	397	95	290	12
Walnut	1,609	977	616	16
Osage-orange	796	159	279	358
Other hardwoods	3,065	1,336	1,112	617
Total	23,181	10,000	10,171	3,010
All species	23,273	10,044	10,184	3,045

Table 5.--Saw log production by species, Kansas, 1969 and 1980

(In thousand board feet)[1/]

Species	1969	1980	Change
Softwoods			
Eastern redcedar	--	321	321
Total	--	321	321
Hardwoods			
Ash	1,396	2,183	787
Basswood	70	10	-60
Birch	80	58	-22
Black cherry	25	18	-7
Cottonwood	6,108	6,107	-1
Elm	3,108	1,458	-1,650
Hackberry	2,990	3,193	203
Pecan	309	348	39
Other hickory	65	74	9
Hard maple	25	--	-25
Soft maple	1,216	1,543	327
Red oak	1,117	2,931	1,814
White oak	894	3,225	2,331
Sycamore	1,303	1,417	114
Walnut	4,150	8,955	4,805
Other hardwoods	71	45	-26
Total	22,927	31,565	8,638
All species	22,927	31,886	8,959

[1/] International 1/4-inch rule.

Table 6.--Saw log production by Unit, species, and State of destination, Kansas, 1980

(In thousand board feet)[1/]

Species	All States	State of destination		
		Kansas	Missouri	Nebraska
ALL UNITS				
Softwoods				
Eastern redcedar	321	321	--	--
Total	321	321	--	--
Hardwoods				
Ash	2,183	2,175	8	--
Basswood	10	9	1	--
Birch	58	55	3	--
Black cherry	18	18	--	--
Cottonwood	6,107	6,042	61	4
Elm	1,458	1,455	3	--
Hackberry	3,193	3,193	--	--
Pecan	348	347	1	--
Other hickory	74	68	6	--
Soft maple	1,543	1,538	5	--
Red oak	2,931	2,637	294	--
White oak	3,225	3,054	46	125
Sycamore	1,417	1,387	30	--
Walnut	8,955	8,161	776	18
Other hardwoods	45	45	--	--
Total	31,565	30,184	1,234	147
All species	31,886	30,505	1,234	147
NORTHEASTERN UNIT				
Softwoods				
Eastern redcedar	128	128	--	--
Total	128	128	--	--
Hardwoods				
Ash	694	691	3	--
Basswood	10	9	1	--
Birch	55	55	--	--
Black cherry	18	18	--	--
Cottonwood	2,382	2,347	35	--
Elm	419	416	3	--
Hackberry	829	829	--	--
Pecan	4	3	1	--
Other hickory	69	68	1	--
Soft maple	280	280	--	--
Red oak	1,027	992	35	--
White oak	1,223	1,082	17	124
Sycamore	226	216	10	--
Walnut	5,287	4,758	511	18
Other hardwoods	4	4	--	--
Total	12,527	11,768	617	142
All species	12,655	11,896	617	142

(Table 6 continued on next page)

[1/] International 1/4-inch rule.

(Table 6 continued)

Species	All States	State of destination		
		Kansas	Missouri	Nebraska
SOUTHEASTERN UNIT				
Softwoods				
Eastern redcedar	25	25	--	--
Total	25	25	--	--
Hardwoods				
Ash	1,310	1,305	5	--
Basswood	--	--	--	--
Birch	3	--	3	--
Black cherry	--	--	--	--
Cottonwood	2,846	2,820	26	--
Elm	955	955	--	--
Hackberry	2,120	2,120	--	--
Pecan	343	343	--	--
Other hickory	5	--	5	--
Soft maple	1,263	1,258	5	--
Red oak	1,783	1,524	259	--
White oak	1,452	1,423	29	--
Sycamore	1,117	1,097	20	--
Walnut	3,551	3,286	265	--
Other hardwoods	34	34	--	--
Total	16,782	16,165	617	--
All species	16,807	16,190	617	--
WESTERN UNIT				
Softwoods				
Eastern redcedar	168	168	--	--
Total	168	168	--	--
Hardwoods				
Ash	179	179	--	--
Basswood	--	--	--	--
Birch	--	--	--	--
Black cherry	--	--	--	--
Cottonwood	879	875	--	4
Elm	84	84	--	--
Hackberry	244	244	--	--
Pecan	1	1	--	--
Other hickory	--	--	--	--
Soft maple	--	--	--	--
Red oak	121	121	--	--
White oak	550	549	--	1
Sycamore	74	74	--	--
Walnut	117	117	--	--
Other hardwoods	7	7	--	--
Total	2,256	2,251	--	5
All species	2,424	2,419	--	5

Table 7.--Saw log production by Unit, county, and species, Kansas, 1980

(In thousand board feet)[1/]

County	All species	Species group												
		Eastern redcedar	Ash	Cotton-wood	Elm	Hack-berry	Pecan	Other hickory	Soft maple	Red oak	White oak	Syca-more	Walnut	Other hardwoods
NORTHEASTERN UNIT														
Atchison	628	1	55	19	10	43	3	1	26	34	54	7	371	4
Brown	114	--	21	6	--	12	--	--	10	3	8	--	54	--
Clay	238	--	33	35	21	46	--	--	--	--	68	14	21	--
Dickinson	35	--	--	--	--	--	--	--	--	--	--	--	35	--
Doniphan	743	3	15	159	24	36	--	--	--	46	22	17	416	5
Douglas	1,357	49	91	103	49	112	--	--	42	196	77	29	605	4
Franklin	1,076	--	52	76	40	61	--	22	31	175	49	26	537	7
Geary	168	8	4	35	7	14	--	--	--	--	28	--	72	--
Jackson	281	1	45	19	1	29	--	--	21	10	23	3	129	--
Jefferson	996	1	116	25	22	76	--	--	49	32	35	--	640	--
Johnson	579	--	11	12	29	43	--	6	7	133	41	8	285	4
Leavenworth	1,070	7	58	78	59	104	--	17	7	152	68	30	487	3
Marshall	722	12	62	57	25	64	--	--	19	40	208	3	232	--
Miami	843	--	24	25	24	14	1	22	28	115	38	31	520	1
Nemaha	270	7	25	28	14	36	--	--	11	17	51	1	25	55
Osage	541	--	21	179	21	0	--	--	7	6	30	7	270	--
Pottawatomie	736	5	21	385	10	29	--	--	--	7	123	14	142	--
Riley	367	21	7	222	--	3	--	--	--	--	60	--	54	--
Shawnee	1,140	8	13	495	63	76	--	1	22	57	113	36	253	3
Wabaunsee	604	5	--	417	--	2	--	--	--	4	74	--	102	--
Washington	117	--	20	7	--	29	--	--	--	--	53	--	7	1
Wyandotte	30	--	--	--	--	--	--	--	--	--	--	--	30	--
Total	12,655	128	694	2,382	419	829	4	69	280	1,027	1,223	226	5,287	87
SOUTHEASTERN UNIT														
Allen	1,902	--	138	276	138	483	--	--	97	273	207	131	159	--
Anderson	337	--	--	7	21	--	--	--	35	7	--	21	246	--
Bourbon	1,315	--	138	16	21	21	30	5	165	256	96	79	488	--
Butler	397	1	17	129	35	55	--	--	--	28	79	8	45	--
Chase	124	--	21	14	7	14	--	--	--	--	28	--	40	--
Chautauqua	260	--	--	4	3	7	1	--	--	25	21	8	191	--
Cherokee	804	--	122	37	54	37	52	--	123	32	52	53	239	3
Coffey	437	--	34	70	32	42	--	--	29	28	18	21	142	21
Cowley	354	5	14	139	18	29	12	--	1	11	32	14	67	12
Crawford	643	1	48	61	38	29	26	--	36	106	43	35	220	--
Elk	39	--	--	--	--	--	--	--	--	--	--	--	39	--
Greenwood	270	1	8	15	6	50	--	--	12	39	37	22	80	--
Labette	2,121	3	127	453	181	383	56	--	179	338	131	102	168	--
Linn	709	1	--	15	--	--	--	--	--	90	14	18	570	1
Lyon	625	7	50	114	34	51	--	--	43	40	117	56	113	--
Marion	39	--	--	--	--	--	--	--	--	--	--	--	39	--
Montgomery	1,120	--	70	133	139	157	98	--	37	86	93	95	212	--
Morris	307	3	48	62	8	39	1	--	--	--	77	21	48	--
Neosho	2,751	3	340	418	170	444	42	--	355	245	252	290	192	--
Wilson	638	--	54	35	40	62	25	--	62	95	48	57	160	--
Woodson	1,615	--	81	848	10	217	--	--	89	84	107	86	93	--
Total	16,807	25	1,310	2,846	955	2,120	343	5	1,263	1,783	1,452	1,117	3,551	37

(Table 7 continued on next page)

[1/] International 1/4-inch rule.

(Table 7 continued)

WESTERN UNIT

County	All species	Species group: Eastern redcedar	Ash	Cotton-wood	Elm	Hack-berry	Pecan	Other hickory	Soft maple	Red oak	White oak	Syca-more	Walnut	Other hardwoods
Barber	145	145	--	--	--	--	--	--	--	--	--	--	--	--
Barton	106	--	--	83	--	--	--	--	--	--	17	6	--	--
Cloud	467	7	39	131	--	58	--	--	--	41	156	21	14	--
Decatur	34	--	28	3	--	--	--	--	--	--	--	--	3	--
Harvey	194	--	7	48	21	35	--	--	--	14	48	--	21	--
Jewell	42	3	--	7	--	1	--	--	--	3	25	--	3	--
Kingman	15	--	--	15	--	--	--	--	--	--	--	--	--	--
Lincoln	77	--	--	14	14	21	--	--	--	--	28	--	--	--
Mcpherson	1	--	--	--	--	--	--	--	--	--	--	--	1	--
Norton	15	1	7	4	--	--	--	--	--	--	--	--	3	--
Ottawa	497	7	48	97	41	62	--	--	--	48	124	35	35	--
Rawlins	22	--	17	--	4	--	--	--	--	--	--	--	1	--
Reno	109	--	14	55	--	7	--	--	--	7	25	--	1	--
Republic	136	1	19	25	--	33	--	--	--	7	48	--	3	--
Rice	174	--	--	118	3	6	--	--	--	--	36	11	--	--
Saline	62	--	--	21	--	11	--	--	--	--	30	--	--	--
Sheridan	75	--	--	72	--	--	--	--	--	--	--	--	3	--
Smith	33	--	--	10	1	4	--	--	--	1	13	--	3	1
Sumner	220	4	--	176	--	6	1	--	--	--	--	1	26	6
Total	2,424	168	179	879	84	244	1	--	--	121	550	74	117	7
State total	31,886	321	2,183	6,107	1,458	3,193	348	74	1,543	2,931	3,225	1,417	8,955	131

Table 8.--Saw log receipts in Kansas by Unit, species and State of origin, 1980

(In thousand board feet)[1/]

Species	All States	State of origin				
		Kansas	Missouri	Nebraska	Oklahoma	Iowa
ALL UNITS						
Softwoods						
Eastern redcedar	321	321	--	--	--	--
Total	321	321	--	--	--	--
Hardwoods						
Ash	2,175	2,175	--	--	--	--
Basswood	9	9	--	--	--	--
Birch	55	55	--	--	--	--
Black cherry	18	18	--	--	--	--
Cottonwood	6,154	6,042	32	80	--	--
Elm	1,541	1,455	--	--	86	--
Hackberry	3,233	3,193	13	3	24	--
Pecan	399	347	11	--	41	--
Other hickory	68	68	--	--	--	--
Soft maple	1,626	1,538	88	--	--	--
Red oak	2,713	2,637	76	--	--	--
White oak	3,114	3,054	23	--	37	--
Sycamore	1,387	1,387	--	--	--	--
Walnut	12,716	8,161	2,967	587	414	587
Other hardwoods	45	45	--	--	--	--
Total	35,253	30,184	3,210	670	602	587
All species	35,574	30,505	3,210	670	602	587
NORTHEASTERN UNIT						
Softwoods						
Eastern redcedar	124	124	--	--	--	--
Total	124	124	--	--	--	--
Hardwoods						
Ash	693	693	--	--	--	--
Basswood	9	9	--	--	--	--
Birch	55	55	--	--	--	--
Black cherry	18	18	--	--	--	--
Cottonwood	2,199	2,167	32	--	--	--
Elm	360	360	--	--	--	--
Hackberry	826	826	--	--	--	--
Pecan	3	3	--	--	--	--
Other hickory	68	68	--	--	--	--
Soft maple	252	252	--	--	--	--
Red oak	964	958	6	--	--	--
White oak	995	995	--	--	--	--
Sycamore	167	167	--	--	--	--
Walnut	11,864	7,309	2,967	587	414	587
Other hardwoods	4	4	--	--	--	--
Total	18,477	13,884	3,005	587	414	587
All species	18,601	14,008	3,005	587	414	587

(Table 8 continued on next page)

[1/] International 1/4-inch rule.

(Table 8 continued)

Species	All States	State of origin				
		Kansas	Missouri	Nebraska	Oklahoma	Iowa
SOUTHEASTERN UNIT						
Softwoods						
Eastern redcedar	33	33	--	--	--	--
Total	33	33	--	--	--	--
Hardwoods						
Ash	1,312	1,312	--	--	--	--
Cottonwood	3,101	3,101	--	--	--	--
Elm	1,048	962	--	--	86	--
Hackberry	2,136	2,099	13	--	24	--
Pecan	396	344	11	--	41	--
Soft maple	1,374	1,286	88	--	--	--
Red oak	1,607	1,537	70	--	--	--
White oak	1,456	1,396	23	--	37	--
Sycamore	1,133	1,133	--	--	--	--
Walnut	699	699	--	--	--	--
Other hardwoods	40	40	--	--	--	--
Total	14,302	13,909	205	--	188	--
All species	14,335	13,942	205	--	188	--
WESTERN UNIT						
Softwoods						
Eastern redcedar	164	164	--	--	--	--
Total	164	164	--	--	--	--
Hardwoods						
Ash	170	170	--	--	--	--
Cottonwood	854	774	--	80	--	--
Elm	133	133	--	--	--	--
Hackberry	271	268	--	3	--	--
Red oak	142	142	--	--	--	--
White oak	663	663	--	--	--	--
Sycamore	87	87	--	--	--	--
Walnut	153	153	--	--	--	--
Other hardwoods	1	1	--	--	--	--
Total	2,474	2,391	--	83	--	--
All species	2,638	2,555	--	83	--	--

Table 9.--Residue produced at primary wood-using mills by type of material, type of use, and unit, Kansas, 1980

Table 9.--Residue produced at primary wood-using mills by type of material, type of use, and Unit, Kansas, 1980

(In thousand tons green weight)

Unit and type of use	Wood residue						Bark	
	Total		Coarse[1]		Fine[2]			
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Northeastern Unit								
Industrial fuel	--	18.84	--	12.03	--	6.81	--	5.11
Domestic fuel[3]	0.14	9.53	0.14	9.41	--	0.12	0.02	3.97
Miscellaneous[3]	.07	4.67	--	--	.07	4.67	--	--
Not used	.01	6.15	.01	3.34	--	2.81	--	1.42
Total	.22	39.19	.15	24.78	.07	14.41	.02	10.50
Southeastern Unit								
Fiber products	--	8.32	--	8.32	--	--	--	--
Charcoal	--	.31	--	.28	--	.03	--	.12
Industrial fuel	--	.07	--	.07	--	--	--	.03
Domestic fuel[3]	.03	3.07	.03	2.96	--	.11	--	1.17
Miscellaneous[3]	.01	7.42	--	.03	.01	7.39	--	.02
Not used	--	11.35	--	7.57	--	3.78	--	6.59
Total	.04	30.54	.03	19.23	.01	11.31	--	7.93
Western Unit								
Domestic fuel[3]	.13	3.51	.12	2.62	.01	.89	.02	1.07
Miscellaneous[3]	.06	.68	--	.05	.06	.63	--	--
Not used	.16	1.06	.10	.64	.06	.42	.02	.34
Total	.35	5.25	.22	3.31	.13	1.94	.04	1.41
All Units								
Fiber products	--	8.32	--	8.32	--	--	--	--
Charcoal	--	.31	--	.28	--	.03	--	.12
Industrial fuel	--	18.91	--	12.10	--	6.81	--	5.14
Domestic fuel[3]	.30	16.11	.29	14.99	.01	1.12	.04	6.21
Miscellaneous[3]	.14	12.77	--	.08	.14	12.69	--	.02
Not used	.17	18.56	.11	11.55	.06	7.01	.02	8.35
Total	.61	74.98	.40	47.32	.21	27.66	.06	19.84

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Livestock bedding, poultry litter, mulch, small dimension, specialty items, etc.

Blyth, James E.; Gould, Leonard K.; Smith, W. Brad.
Primary forest products industry and timber use, Kansas, 1980. Resour. Bull. NC-77. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1984. 13 p.

Highlights recent Kansas forest industry trends, production and receipts of saw logs in 1980, and production of other timber products in 1980. Reports on wood and bark residue generated at primary mills and the disposition of this residue.

KEY WORDS: Saw logs, sawmills, fuelwood, posts, and mill residue.

United States Department of Agriculture

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North Central Forest Experiment Station

Resource ~~Research~~ Bulletin **NC-78**

Timber Resource of Wisconsin's Northeast Survey Unit, 1983

Mark H. Hansen

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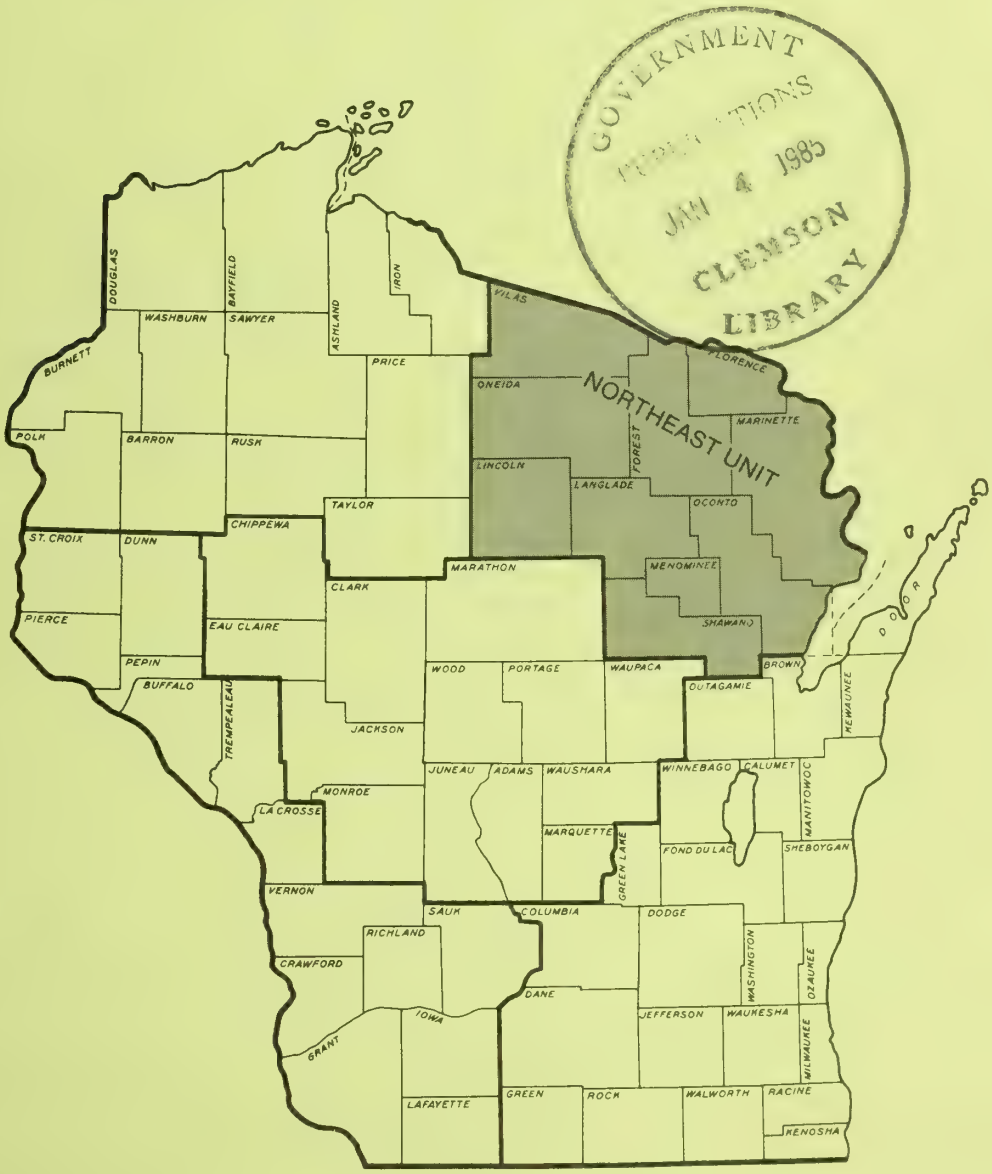

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1992 Folwell Avenue
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Information contained in this report includes the most commonly used Forest Inventory and Analysis statistics. However, additional forest resource data can be provided to interested users. Persons requesting additional information that can be provided from the raw inventory data are expected to pay for the retrieval costs. These costs will vary depending on the complexity of the request, from less than $100 for a relatively simple request to $2,000 for a complex retrieval involving the services of a Forest Inventory and Analysis computer programmer. If requests for data conflict with ongoing Forest Inventory and Analysis work, they will be scheduled so as to minimize the impact on the work unit.

Requests for unpublished information may be directed to:

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Area served: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, Wisconsin.

FOREWORD

Forest Inventory and Analysis (FIA) is a continuing endeavor as mandated by the Renewable Forest and Rangeland Resources Planning Act of 1974. Prior inventories were mandated by the McSweeney-McNary Forest Research Act of 1928. The objective of FIA is to periodically inventory the Nation's forest land to determine its extent, condition, and volume of timber, growth, and depletions. Up-to-date resource information is essential to frame intelligent forest policies and programs. USDA Forest Service regional experiment stations are responsible for conducting these inventories and publishing summary reports for individual States. The North Central Forest Experiment Station is responsible for forest resource evaluation in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, and Wisconsin.

Fieldwork for the Wisconsin Statewide forest inventory was begun in the summer of 1981 and completed in late 1983. Reports on the three previous inventories of Wisconsin's timber resource are dated 1936, 1956, and 1968.

More accurate survey information was obtained during the 1983 survey than otherwise would have been feasible because of intensified field sampling. Such sampling was made possible by additional funding and field personnel provided the North Central Station by the Wisconsin State Legislature through the Department of Natural Resources. Data from the Departments' canvass of all primary wood-using plants in the State was used to help estimate the quantity of timber products harvested in Wisconsin.

Aerial photos used in the Northeast Unit Forest Inventory were furnished by the Wisconsin Department of Natural Resources, the USDA Agricultural Stabilization and Conservation Service, and the Chequamegon and Nicolet National Forests.

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TIMBER RESOURCE OF WISCONSIN'S NORTHEAST SURVEY UNIT, 1983

Mark H. Hansen, *Biometrician*

HIGHLIGHTS

Forest Area

- Forest land accounted for 4.0 million acres (71 percent of the Unit's land area) in 1983, this constitutes a 4.6 percent decline since 1968.
- Commercial forest land occupied 3.8 million acres in 1983—a decline of 5.7 percent from the 4.1 million acres in 1968.
- Productive-reserved forest land totaled 52,000 acres in 1983, compared to 1,800 acres in 1968. Major additions since 1968 include the Blackjack Springs Wilderness Area, Wisker Lake Wilderness Area, and Roadless Area Review and Evaluation (RARE II) areas in the Nicolet National Forest.
- Marinette County contained the largest area of commercial forest in 1983 (639,700 acres) and in 1968 (649,900 acres).
- Farmers and miscellaneous private individuals continued to hold 40 percent of the commercial forest (1.6 million acres in 1968 and 1.5 million acres in 1983). A new definition of farm ownership shifted much of what was previously in the farmer category to the miscellaneous private category.
- County and municipal agencies owned 646,900 acres of commercial forest in 1983 (17 percent).
- The aspen and maple-birch forest types continue to dominate the commercial forest land base in 1983 comprising 60 percent of the commercial forest area.
- Sapling and seedling stands occupied 24 percent of the commercial forest in 1983 as compared to 31 percent in 1968.
- Sawtimber stands, which increased by 331,300 acres between surveys, amounted to 28 percent of commercial forest in 1983, compared to 18 percent 1968.
- Seventy-one percent (118,100 acres) of the commercial plantation area is in the red pine type.
- Twenty-four percent of all commercial forest area has balsam fir as a prominent conifer in the understory.
- Less than 5 percent of all forest land is unproductive or reserved.
- Stands aged 70 years or more increased from 15 percent of the commercial forest area in 1968 to 21 percent in 1983.
- The average site index for commercial forest land in the Unit is 63 feet at age 50.

Timber Volume

- The volume of growing stock in 1983 was 4.5 billion cubic feet, 23 percent greater than the 3.6 billion in 1968.
- Sawtimber volume amounted to 9.9 billion board feet in 1983, 35 percent greater than the 1968 volume.
- The 3.1 billion cubic feet of hardwoods make up 68 percent of the growing-stock volume.
- Red pine growing-stock volume increased 123 percent since 1968. Ingrowth of plantations to merchantable size was the dominant factor in this dramatic increase.
- The maples (938 million cubic feet), aspens (744 million), and pines (571 million) contain the highest volumes, and together account for more than 50 percent of the growing-stock volume.
- Average growing-stock volume per acre in 1983 was 1,169 cubic feet, compared to 893 cubic feet in 1968.
- Forty-nine percent of the growing-stock volume is in stands from 41- to 70-years-old.
- Nearly two-thirds of the sawtimber volume is in trees with grade 3 butt logs. Tree diameter is generally the limiting criteria.
- The volume in cull trees (rough, rotten, and short-log cull) is 361 million cubic feet; salvable dead tree volume is 82 million cubic feet.

Stand Conditions

- Net annual growth on growing-stock trees was 138 million cubic feet in 1982.

- The net annual growth rate of growing stock was 3.1 percent of inventory in 1982.
- Net growth averaged 36.1 cubic feet per acre in 1982.
- Annual mortality of growing stock amounted to 37 million cubic feet (0.8 percent of inventory) in 1982.
- Disease accounted for 19 percent of the mortality in 1982; chiefly diseases of aspen and elm.

Timber Use

- Timber removals from growing stock in 1982 totaled nearly 103 million cubic feet (2.3 percent of inventory), compared to 74 million cubic feet (2.0 percent of inventory) in 1967.
- The aspens made up 40 percent of the 1982 removals volume, although they account for only 17 percent of the growing-stock volume.
- Output of roundwood products totaled 120 million cubic feet in 1981; 58 percent was pulpwood, 19 percent was fuelwood, and 22 percent was saw logs.
- Wood residue from primary plants totaled 14.9 million cubic feet in 1981, 98 percent of which was used.

Biomass

- Highest yields of live tree biomass are in the white pine (87 green tons per acre), the maple-birch (84 tons), and the oak-hickory (83 tons) forest types.
- Live tree biomass (trees greater than 1-inch in d.b.h.) totaled 258 million green tons (67 tons per acre) in 1983, with just over half in the boles of growing-stock trees.

APPENDIX

ACCURACY OF SURVEY

Forest Inventory and Analysis information is based on a sampling procedure designed to provide reliable statistics at the State and Unit levels. Consequently, the reported figures are estimates only. A measure of reliability of these figures is given by sampling errors. These sampling errors mean that the chances are two out of three that if a 100-percent inventory had been taken, using the same methods, the results would have been within the limits indicated.

For example, the estimated growing-stock volume in the Northeast Unit in 1983, 4,474.1 million cubic feet, has a sampling error of ±1.78 percent (±79.6 million cubic feet). The growing-stock volume from a 100-percent inventory would be expected to fall between 4,394.5 and 4,553.7 million cubic feet (4,474.1 ±79.6), there being a one in three chance that this is not the case.

Sampling errors were calculated separately for National Forest land and other land because of the difference in the way the inventories were conducted. For example, the sampling error for growing-stock volume on land other than National Forest is ±1.94 percent but for Nicolet National Forest land it is ±3.48 percent. Different survey intensities resulted in different sampling errors.

The following tabulation shows the sampling errors for the 1983 Northeast Unit Forest Inventory:

Item	Unit totals	Sampling error
Growing stock	(Million cubic feet)	(Percent)
Volume	4,474.1	1.78
Growth	138.2	2.32
Removals	102.7	15.84
Sawtimber	(Million board feet[1])	
Volume	9,868.7	3.05
Growth	392.5	3.29
Removals	276.6	19.52
Commercial forest land	(Thousand acres) 3,828.5	0.44

As survey data are broken down into sections smaller than Survey Unit totals, the sampling error increases. For example, the sampling error for growing-stock volume in a particular county is higher than that for total growing-stock volume in the Unit (table 66 shows the sampling errors for estimates smaller than Unit totals).

SURVEY PROCEDURES

We used a two-phase sampling design for the 1983 Wisconsin survey. This sampling scheme and associated estimators are similar to sampling with partial replacement (SPR) in that a set of randomly located plots was available for remeasurement and a set of

[1] *International ¼-inch rule.*

new randomly located plots were established and measured. Major enhancements in the new Wisconsin design were stratification for disturbance on the old sample and use of a growth model to improve regression estimates made on the old undisturbed forest plots. The growth model used was the Stand and Tree Evaluation and Modeling System (STEMS).[2]

The major steps in the new survey design were as follows:

1. The first phase of the survey was to interpret aerial photos. In this phase two sets of random points were located on current aerial photographs. The first was a set of new photo points and the second was a set of relocated old photo points (ground plot locations from the previous inventory). A total of 30,080 1-acre points, including old ground sample locations, were systematically distributed across aerial photos of the entire Unit, except the Chequamegon and Nicolet National Forests. These points were classified into land classes as shown below to make a preliminary estimate of forest area. Next, a total of 21,516 of these points were stereoclassified as to stand-size class and density. Finally, a total of 2,794 points were examined on the ground to correct the preliminary area estimate for errors in classification and for actual changes in land use since the photos were taken.

Land class	Photo points classified	Photo points stereoclassified	Inventory plots checked
Forest land	21,003	21,003	1,948
Unproductive/reserved forest land	111	111	11
Nonforest land			
with trees	402	402	51
without trees	6,971	0	642
water	1,593	0	142
Total	30,080	21,516	2,794

2. The second phase of the survey was to sample ground plots. The plot selection and measurement procedures of phase two of the new Wisconsin survey design are outlined in figure 1.

From the new photo points, a random sample of ground plots were established and land use, volume, mortality and cutting were recorded. At each forest ground plot location, variable-radius plots (basal area factor 37.5) were established at 10 points uniformly

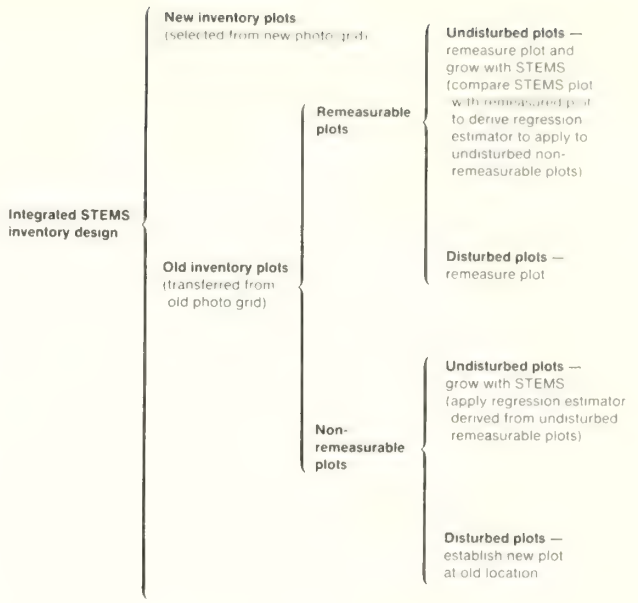
Integrated STEMS inventory design
New inventory plots
(selected from new photo grid)
Old inventory plots
(transferred from old photo grid)
Remeasurable plots
Non-remeasurable plots
Undisturbed plots — remeasure plot and grow with STEMS (compare STEMS plot with remeasured plot to derive regression estimator to apply to undisturbed non-remeasurable plots)
Disturbed plots — remeasure plot
Undisturbed plots — grow with STEMS (apply regression estimator derived from undisturbed remeasurable plots)
Disturbed plots — establish new plot at old location

Figure 1.—*Logic structure for the 1983 Wisconsin sample design.*

placed over the sample acre. These locations were monumented for future remeasurement.

On the old inventory photo points (old plot locations) we used a somewhat different procedure. Old plots were either remeasurable (monumented) or nonremeasurable (not monumented and thus difficult to relocate). Within both of these groups, old plots were additionally identified as undisturbed or disturbed. The remeasurable old inventory photo points which are classified as forest undisturbed were remeasured on the ground to obtain current land use, volume, growth, and removals data. Additionally, all forest undisturbed remeasurable plots were projected to the current time using STEMS to provide estimates of current volume and growth. The comparison of the projected and observed values on these plots provided regression estimators to adjust the projected values of the undisturbed nonremeasurable plots. All disturbed remeasurable plots were remeasured on the ground to assess changes since the last inventory.

Disturbance as used here refers to any change on a plot that can be detected on aerial photos and that the STEMS growth processor cannot predict, such as catastrophic mortality, cutting, seedling stands, and land use change.

The nonremeasurable forest points are those that were not monumented during the 1968 inventory but played a crucial role in the new survey design. The nonremeasurable undisturbed forest points were visited on the ground at the time of the last survey and

[2]*For more information on STEMS, see: Belcher, D. L.; Holdaway, M. R.; Brand, G. J. A description of STEMS: The stand and tree evaluation and modeling system. Gen. Tech. Rep. NC-79. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1981. 18 p.*

following careful examination of both past and current photographs it was determined that nothing happened that STEMS was unable to simulate. STEMS was then used to update the old plot and tree data to produce an estimate of current data. Thus these points became ground plots even though the information was obtained without actually visiting the plot. The plot record for each updated plot was sent to the field for verification of current ownership information. For points classified as disturbed, a new ground plot was established as close to the old location as possible. This allowed information about land use trends to be recorded even though the old plot could not be exactly relocated for remeasurement.

The estimation procedure for computing statistics from this sampling design was more complicated than the simple two-phase estimation procedure used in the past. In fact, this procedure yielded two independent samples, one coming from the new photo points and the other from the old photo points that were remeasured or projected. A more detailed description of the sampling design is available in a separate publication.[3]

3. Under an agreement with National Forest Region 9, North Central crews remeasured 10-point variable radius plots on the Chequamegon and Nicolet National Forests at the same time they remeasured other plots in the Northwest Unit. The Chequamegon and Nicolet National Forests provided the Station with area of commercial forest land by forest type, stand-size class, and density for the Forest. The Station then computed volume, growth, and mortality statistics. Area and volume tables for the Forest were approved by the National Forest staff before publication.

4. Statistics on timber utilization during 1981 were obtained from mill surveys. The Wisconsin Department of Natural Resources canvassed resident sawmills, veneer mills, and other primary wood-using plants. The North Central Forest Experiment Station canvassed out-of-State sawmills, pulpmills, and veneer mills to determine their use of Wisconsin timber. Fuelwood and fencepost output was based on a sample of public and private landowners to determine their production of fuelwood and fenceposts. Estimates of primary mill residue used for fuelwood were obtained from the canvass of Wisconsin primary wood-using plants.

5. A total of 2,568 felled trees on 133 active logging operations were measured throughout the State during 1981-1982 to develop wood utilization factors for converting timber products output to timber removals for saw logs and pulpwood. Factors for all other products were obtained during the 1966-1967 Wisconsin utilization study.

6. Field data were sent to St. Paul, Minnesota, to be processed and analyzed.

COMPARING WISCONSIN'S FOURTH INVENTORY WITH THE THIRD INVENTORY

Data from new forest inventories are often compared with data from earlier inventories to determine trends in forest resources. However, changes in procedures and definitions between surveys often make it necessary to adjust earlier survey data so that they are comparable to data from the new survey. A consistency check will be made for each Forest Unit in Wisconsin to ensure that the changes observed between inventories reflect actual changes in the resource and not changes in definitions or procedures.

Identifying and Correcting Procedural Changes

Between the 1968 and 1983 inventories of Northeast Wisconsin some procedural changes were made in the method of deriving annual mortality estimates and determining forest type.

Mortality figures for the 1968 inventory were based on field estimates from nonremeasurement plots. Information gathered on remeasurement plots during the current inventory was used to adjust the 1968 mortality figures. This adjustment also changed the estimate of net growth for the 1968 inventory. Additionally, the old spruce-fir forest type was separated into two distinct types for the new inventory—white spruce and balsam fir. Comparisons with old data may be made by adding the two new types together. Volumes for hard and soft maple in 1968 were adjusted upwards by 17 percent due to the discovery that the volume equations used for these species in 1968 were in error. Ownership class definitions also changed between the two inventories. A new definition of Indian ownership shifted a large area reported in 1968 as forest industry owned to the Indian ownership class in this report. Also, a change in the definition of farmer ownership shifted area reported in 1968 as farmer owned to the miscellaneous private ownership class in this report.

[3] *Hahn, J. T.; Hansen, M. H.; Fairweather, S. E. A sampling procedure incorporating a growth simulator. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; (Manuscript in process).*

Except for the net growth and mortality information, volumes of hard and soft maple, and some ownership classes, the old and new inventories of this region may be directly compared.

Checking for Consistency

A test was made to ensure that it was possible to move from the adjusted 1968 resource statistics to the 1983 values by means of Timber Resource Analysis System (TRAS), a USDA Forest Service computer program for updating, backdating, and projecting timber volume, growth, mortality, and removals. Using the adjusted 1968 numbers of softwood and hardwood trees by 2-inch diameter class and applying 1983 cubic feet per tree estimates, volumes were generated for the 1968 inventory that are comparable with 1983 volumes. Then, using growth rates, mortality rates, and removals rates for the period between the two surveys, TRAS projected the inventory from 1968 to 1983. The program prints out volumes by diameter class for softwoods and hardwoods for selected years in the period. Thus, inconsistencies in volume, growth, mortality, and removals were identified and resolved.

TRAS generates an estimate of what total removals had to be for the inventory to have changed as it did between surveys, given the volume, growth, and mortality data. Estimates of removals for products and for logging residues, two of the three components of total timber removals, were available from an independent utilization study. An estimate of "other" removals (see Definition of Terms in Appendix), the third component of total removals, was made by subtracting the first two removals components from the TRAS-generated total removals estimate. This estimate of "other" removals was compared with findings from remeasurement plots and new plots (stump counts and land use change) to check its validity. When necessary, TRAS was rerun and adjusted until other removals were compatible with the estimate from field data. Total removals were "trend level removals" because the estimate of "other" removals was based on a removals trend line from 1968 to 1983.

LOG GRADE

In Wisconsin's Northeast Unit the butt log of every sawtimber tree on every full permanent sample plot was graded for quality.

Butt logs were graded on the basis of external characteristics as indicators of quality. Hardwood species were graded according to "Hardwood Log Grades for Standard Lumber."[4] The best 12-foot section of the lowest 16-foot hardwood log, or the best 12-foot upper section if the butt log did not meet minimum log-grade standards, was graded as follows:

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[4] *Vaughn, C. L.; Wollin, C. A.; McDonald, K. A.; Bulgrin, E. H. Hardwood log grades for standard lumber. Res. Pap. FPL-63. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory; 1966. 52 p.*

Forest Service standard grades for hardwood factory saw logs

Grading factors		Specifications							
		Log grade 1			Log grade 2				Log grade 3
Position in tree		Butts only	Butts and uppers		Butts and uppers				Butts and uppers
Scaling diameter, inches		[1]13-15	16-19	20+	[2]11+		12+		8+
Length without trim, feet			10+		10+	8-9	10-11	12+	8+
Required clear cuttings[3] of each of three best faces[4]	Min. length, feet	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	No Limit
	Min. proportion of log length required in clear cutting	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep and crook allowance	For logs with less than one-fourth of end in sound defects		15 percent			30 percent			50 percent
	For logs with more than one-fourth of end in sound defects		10 percent			20 percent			35 percent
Maximum scaling deduction			40 percent[5]			50 percent[6]			50 percent

[1]Ash and basswood butts can be 12 inches if they otherwise meet requirements for small #1's.
[2]Ten-inch logs of all species can be #2 if they otherwise meet requirements for small #1's.
[3]A clear cutting is a portion of a face, extending the width of the face, that is free of defects.
[4]A face is one-fourth of the surface of the log as divided lengthwise.
[5]Otherwise #1 logs with 41-60 percent deductions can be #2.
[6]Otherwise #2 logs with 51-60 percent deductions can be #3.

Forest Service standard specifications for hardwood construction logs (tie and timber logs)[1]

Position in tree		Butt and upper
Min. diameter, small end		8 inches +
Min. length, without trim		8 feet
Clear cuttings		No requirements.
Sweep allowance, absolute		One-fourth of the diameter at the small end for each 8 feet of length.
Sound surface defects	Single knots	Any number, if no one knot has an average diameter above the callus in excess of one-third of the log diameter at point of occurrence.
	Whorled knots	Any number if sum of knot diameters above the callus does not exceed one-third of the log diameter at point of occurrence.
	Holes	Any number provided none has a diameter over one-third of the log diameter at point of occurrence, and none extends more than 3 inches into included timber.[2]
Unsound surface defects		Same requirements as for sound defects if they extend into included timber.[2] No limit if they do not.
End defects	Sound	No requirements.
	Unsound	None allowed; log must be sound internally, but will admit one shake not to exceed one-fourth the scaling diameter and will admit a longitudinal split not extending more than 5 inches into the contained timber.

[1]These specifications are minimum for the class. If, from a group of logs, factory logs are selected first, thus leaving only nonfactory logs from which to select construction logs, then the quality range of the construction logs so selected is limited, and the class may be considered a grade. If selection for construction logs is given first priority, it may be necessary to subdivide the class into grades.

[2]Included timber is always square, and dimension is judged from small end.

Softwood species were graded according to the following specifications on the following page.

Log Grades for Eastern White Pine

Log grade	Minimum size Diameter	Length[1]	Sweep or crook allowance	Total cull allowance including sweep	Maximum weevil injury	Allowable knot size (inches)[2] on three best faces or minimum clearness on four faces
	(Inches)	*(Feet)*	*(Percent)*		*(Number)*	*(Inches)*
1	12 & 13	8-16	20	50	0	Four faces clear full length
	14+	10-16	20	50	0	Two faces clear full length, or four faces clear 50 percent length (6 feet min. length)[3]
2	6+	8-16	30	50	0	Sound knots 1.e[4] D/6 and less than 3 inches.[5] Unsound knots: 1.e. 1½ inches and for: butt, logs 1.e. D/12, upper logs 1.e.D/10, or four faces clear 50 percent of length
3	6+	8-16	40	50	8-foot logs: 1 weevil 10-foot+ logs: 2 weevils	Sound knots 1.e.D/3 and less than 5 inches. Unsound knots 1.e. D/6 and less than 2½ inches.
4	6+	8-16	50	50	No limit	No limit

[1]Plus trim.
[2]Disregard all knots less than ½-inch diameter in all grades.
[3]The sum of the diameter of sound knots plus twice the sum of the diameter of unsound knots (in inches) in less than or equal to half of the diameter of the log (inches).
[4]I.e. means less than or equal to.
[5]D means d.i.b. of log at location of knot.

LOG GRADES FOR JACK PINE AND RED PINE

Grade 1: logs with three or four clear faces.[5]

Grade 2: logs with one or two clear faces.

Grade 3: logs with no clear faces.

After the tentative log grade is established, the log will be degraded one grade for each of the following, except that no log can be degraded below grade 3. Net scale after deduction for defect must be at least 50 percent of the gross contents of the log.

1. *Sweep.* Degrade any tentative 1 or 2 log one grade if sweep amounts to 3 or more inches and equals or exceeds one-third the diameter inside bark at small end.

2. *Heart rot.* Degrade any tentative 1 or 2 log one grade if conk, massed hyphae, or other evidence of advanced heart rot is found anywhere in it.

[5]*A face is one fourth of the circumference in width extending full length of the log. Clear faces are those free of: knots measuring more than ½-inch in diameter, overgrown knots of any size, holes more than ¼-inch in diameter. Faces may be rotated to obtain the maximum number of clear ones.*

LOG GRADES FOR ALL OTHER SOFTWOOD LOGS

Grade 1

1. Logs must be 16 inches in diameter or larger, 10 feet in length or longer, and have not more than 30 percent of gross scale deducted for defect.

2. Logs must be at least 75 percent clear on each of three faces.

3. All knots outside clear cutting must be sound and not more than 2½-inches in size.

Grade 2

1. Logs must be 12 inches in diameter or larger, 10 feet in length or longer, and have a net scale of at least 50 percent of the gross contents of the log after deduction for defect.

2. Logs must be at least 50 percent clear on each of three faces or 75 percent clear on two faces.

Grade 3

1. Logs must be 6 inches in diameter or larger, 8 feet in length or longer, and have a net scale of at least 50 percent of the gross contents of the log after deduction for defect.

Note: (A) Diameters are diameter inside bark (d.i.b.) at small end of log.
(B) Percent clear refers to percent clear in one continuous section.

TREE SPECIES GROUPS IN WISCONSIN[6]

SOFTWOODS
- Jack pine ..... *Pinus banksiana*
- Red pine ..... *Pinus resinosa*
- Eastern white pine ..... *Pinus strobus*
- White spruce ..... *Picea glauca*
- Black spruce ..... *Picea mariana*
- Balsam fir ..... *Abies balsamea*
- Eastern hemlock ..... *Tsuga canadensis*
- Tamarack ..... *Larix laricina*
- Northern white-cedar ..... *Thuja occidentalis*
- Other softwoods
  - Eastern redcedar ..... *Juniperus virginiana*
  - Norway spruce ..... *Picea abies*
  - Scotch pine ..... *Pinus sylvestris*

HARDWOODS
- White oaks
  - White oak ..... *Quercus alba*
  - Swamp white oak ..... *Quercus bicolor*
  - Bur oak ..... *Quercus macrocarpa*
  - Chinkapin oak ..... *Quercus muehlenbergii*
- Select red oak
  - Northern red oak ..... *Quercus rubra*
- Other red oaks
  - Northern pin oak ..... *Quercus ellipsoidalis*
  - Black oak ..... *Quercus velutina*
- Select hickory
  - Shagbark hickory ..... *Carya ovata*
- Other hickory
  - Bitternut hickory ..... *Carya cordiformis*
- Yellow birch ..... *Betula alleghaniensis*
- Hard maple
  - Sugar maple ..... *Acer saccharum*
  - Black maple ..... *Acer nigrum*
- Soft maples
  - Red maple ..... *Acer rubrum*
  - Silver maple ..... *Acer saccharinum*
- Ashes
  - White ash ..... *Fraxinus americana*
  - Black ash ..... *Fraxinus nigra*
  - Green ash ..... *Fraxinus pennsylvanica*
- Balsam poplar ..... *Populus balsamifera*
- Eastern cottonwood ..... *Populus deltoides*
- Sycamore ..... *Platanus occidentalis*
- Aspens
  - Bigtooth aspen ..... *Populus grandidentata*
  - Quaking aspen ..... *Populus tremuloides*
- American basswood ..... *Tilia americana*
- Beech ..... *Fagus grandifolia*
- Black walnut ..... *Juglans nigra*
- Black cherry ..... *Prunus serotina*
- Butternut ..... *Juglans cinerea*
- Elms
  - American elm ..... *Ulmus americana*
  - Slippery elm ..... *Ulmus rubra*
  - Rock elm ..... *Ulmus thomasii*
- Hackberry ..... *Celtis occidentalis*
- Paper birch ..... *Betula papyrifera*
- Black willow ..... *Salix nigra*
- Other hardwoods
  - Boxelder ..... *Acer negundo*
  - Black locust ..... *Robinia pseudoacacia*
  - Honeylocust ..... *Gleditsia triacanthos*
  - River birch ..... *Betula nigra*
  - Red mulberry ..... *Morus rubra*
  - Blackgum ..... *Nyssa sylvatica*
  - Northern Catalpa ..... *Catalpa speciosa*
- Noncommercial species
  - Mountain maple ..... *Acer spicatum*
  - Eastern hophornbeam ..... *Ostrya virginiana*
  - Peachleaf willow ..... *Salix amygdaloides*
  - American hornbeam ..... *Carpinus caroliniana*
  - Hawthorn ..... *Crataegus* spp.
  - Striped maple ..... *Acer pensylvanicum*
  - Mountain ash ..... *Sorbus* spp.
  - Pin cherry ..... *Prunus pensylvanica*
  - Chokecherry ..... *Prunus virginiana*

METRIC EQUIVALENTS OF UNITS USED IN THIS REPORT

1 acre = 4,046.86 square meters or 0.405 hectare.
1,000 acres = 405 hectares.
1 cubic foot = 0.0283 cubic meter.
1 foot = 30.48 centimeters or 0.3048 meter.
1 inch = 25.4 millimeters, 2.54 centimeters, or 0.0254 meter.
1 pound = 0.454 kilogram.
1 ton = 0.907 metric ton.

DEFINITION OF TERMS

Basal area.—The area in square feet of the cross section at breast height of a single tree. When the basal area of all trees in a stand are summed, the result is usually expressed as square feet of basal area per acre.

[6]*The common and scientific names are based on: Little, Elbert L. Check list of native and naturalized trees of the United States. Agric. Handb. 541. Washington, DC: U.S. Department of Agriculture, Forest Service; 1979. 375 p.*

Biomass.—The above-ground volume of all live trees (including bark and foliage). Biomass is made up of 5 components:

Growing-stock bole.—Biomass of a growing-stock tree from a 1-foot stump to a variable 4-inch top.

Growing-stock tops and limbs.—Biomass of a growing-stock tree from a 1-foot stump minus the growing-stock bole.

Cull bole.—Biomass of a cull tree from a 1-foot stump to a variable 4-inch top.

Cull tops and limbs.—Biomass of a cull tree from a 1-foot stump minus the cull bole.

1- to 5-inch trees.—Biomass of all live trees from 1-to 5-inches in diameter at breast height.

Commercial forest land.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commercial forest land are capable of producing more than 20 cubic feet per acre per year of annual growth when managed. Currently inaccessible and inoperable areas are included except when the areas involved are small and unlikely to become suitable for producing industrial wood in the foreseeable future.)

Commercial species.—Tree species presently or prospectively suitable for industrial wood products. (Note: Excludes species of typically small size, poor form, or inferior quality such as hophornbeam and hawthorn.)

County and municipal land.—Land owned by counties and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

Cull.—Portions of a tree that are unusable for industrial wood products because of rot, form, or other defect.

Diameter classes.—A classification of trees based on diameter outside bark, measured at breast height (4-½ feet above the ground). (Note: d.b.h. is the common abbreviation for diameter at breast height. Two-inch diameter classes are commonly used in Forest Survey, with the even inch the approximate midpoint for a class. For example, the 6-inch class includes trees 5.0 through 6.9 inches d.b.h.)

Farm.—Any land from which $1,000 or more of agricultural products were produced and sold during the year.

Farmer-owned land.—Land owned by farm operators. (Note: Excludes land leased by farm operators from nonfarm owners, such as railroad companies and States.)

Forest land.—Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. (Note: Stocking is measured by comparing specified standards with basal area and/or number of trees, age or size, and spacing.) The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas shall be classed as forest if less than 120 feet wide. Also see definitions for land area, commercial forest land, noncommercial forest land, productive-reserved forest land, stocking, unproductive forest land, and water.

Forest industry land.—Land owned by companies or individuals operating primary wood-using plants.

Forest trees.—Woody plants having a well-developed stem and usually more than 12 feet tall at maturity.

Forest type.—A classification of forest land based on the species forming a plurality of live tree stocking. Major forest types in the State are:

Jack pine.—Forests in which jack pine comprises a plurality of the stocking. (Common associates include eastern white pine, red pine, aspen, birch, and oak.)

Red pine.—Forests in which red pine comprises a plurality of the stocking. (Common associates include eastern white pine, jack pine, aspen, birch, and oak.)

White pine.—Forests in which eastern white pine comprises a plurality of the stocking. (Common associates include red pine, aspen, birch, and maple.)

Balsam fir.—Forests in which balsam fir and white spruce comprise a plurality of the stocking with balsam fir the most common. (Common associates include white spruce, aspen, maple, birch, northern white-cedar, and spruce.)

White spruce.—Forests in which white spruce and balsam fir comprise a plurality of the stocking with white spruce the most common. (Common associates include balsam fir, aspen, maple, birch, and northern white-cedar.)

Black spruce.—Forests in which swamp conifers comprise a plurality of the stocking with black spruce the most common. (Common associates include tamarack, northern white-cedar, and balsam fir.)

Northern white-cedar.—Forests in which swamp conifers comprise a plurality of the stocking with northern white-cedar the most common. (Common associates include balsam fir, black ash, spruce, and black spruce.)

Tamarack.—Forests in which swamp conifers comprise a plurality of the stocking with tamarack the most common. (Common associates include black spruce, balsam fir, and aspen.)

Oak-hickory.—Forests in which northern red oak, white oak, bur oak, or hickories, singly or in combination, comprise a plurality of the stocking. (Common associates include jack pine, aspen, birch, and maple.)

Elm-ash-soft maple.—Forests in which lowland elm, ash, cottonwood, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include aspen, birch, and balsam fir.)

Maple-birch.—Forests in which sugar maple, basswood, yellow birch, elm, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include white pine, elm, hemlock, and basswood.)

Aspen.—Forests in which quaking aspen or bigtooth aspen, singly or in combination, comprise a plurality of the stocking. (Common associates include oak, pine, balsam fir, and paper birch.)

Paper birch.—Forests in which paper birch comprises a plurality of the stocking. (Common associates include maple, aspen, and balsam fir.)

Exotic.—Forests in which species not native to the State comprise a plurality of the stocking. (Mostly Scotch pine plantations.)

Gross area.—The entire area of land and water as determined by the Bureau of the Census, 1970.

Growing-stock trees.—Live trees of commercial species, excluding rough and rotten trees.

Growing-stock volume.—Net volume in cubic feet of growing-stock trees 5 inches d.b.h. and over, from a 1-foot stump to a minimum 4 inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs. Cubic feet can be converted to standard cords by dividing by 79. One standard cord is 128 cubic feet of stacked wood, including bark and air.

Hardwoods.—Dicotyledonous trees, usually broadleaved and deciduous.

Idle farmland.—Includes former cropland, orchards, improved pastures, and farm sites not tended within the past 2 years and presently less than 16.7 percent stocked with trees.

Improved pasture.—Land currently improved for grazing by cultivating, seeding, irrigating, or clearing of trees or brush and less than 16.7 percent stocked with live trees.

Indian land.—All lands held in trust by the United States for individual Indians or tribes, or all lands, titles to which are held by individual Indians or tribes, subject to Federal restrictions against alienation.

Land area.—A. *Bureau of the Census.* The area of dry land and land temporarily or partly covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than one-eighth of a statute mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

B. *Forest Inventory and Analysis.* The same as the Bureau of the Census, except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

Live trees.—Growing-stock, rough, and rotten trees 1 inch d.b.h. and larger.

Log grades.—A classification of logs based on external characteristics as indicators of quality or value. (See Appendix for specific grading factors used.)

Logging residues.—The unused growing stock portions of trees cut or killed by logging.

Maintained road.—Any road, hard-topped or other surfaces, that is plowed or graded at least once a year. Includes rights-of-way that are cut or treated to limit herbaceous growth.

Marsh.—Nonforest land that characteristically supports low, generally herbaceous or shrubby vegetation and that is intermittently covered with water.

Merchantable.—Refers to a pulpwood or saw log section that meets pulpwood or saw log specifications, respectively.

Miscellaneous federal land.—Federal land other than National Forest, land administered by the Bureau of Land Management, and Indian land.

Miscellaneous private land.—Privately owned land other than forest-industry and farmer-owned land.

Mortality.—The volume of sound wood in growing-stock and sawtimber trees that die annually.

National Forest land.—Federal land that has been legally designated as National Forest or purchase units, and other land administered by the USDA Forest Service.

Net annual growth of growing stock.— The annual change in volume of sound wood in live sawtimber and poletimber trees and the total volume of trees entering these classes through ingrowth, less volume losses resulting from natural causes.

Net annual growth of sawtimber.—The annual change in the volume of live sawtimber trees and the total volume of trees reaching sawtimber size, less volume losses resulting from natural causes.

Net volume.—Gross volume less deductions for rot, sweep, or other defect affecting use for timber products.

Noncommercial forest land.—(a) Unproductive forest land and (b) productive-reserved forest land.

Noncommercial species.—Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land.—Land that has never supported forests, and land formerly forested where use for timber management is precluded by development

for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide and more than 1 acre in area to qualify as nonforest land.)

a. *Nonforest land without trees.*—Nonforest land with no live trees present.

b. *Nonforest land with trees.*—Nonforest land with one or more trees per acre at least 5 inches d.b.h.

Nonstocked land.—Commercial forest land less than 16.7 percent stocked with growing-stock trees.

Other removals.—Growing-stock trees removed but not utilized for products, or trees left standing but "removed" from the commercial forest land classification by land use change. Examples are removals from cultural operations such as timber stand improvement work, land clearing, and changes in land use.

Ownership.—Property owned by one owner, regardless of the number of parcels in a specified area.

Ownership size class.—The amount of commercial forest land owned by one owner, regardless of the number of parcels.

Owner tenure.—The length of time a property has been held by the owner.

Physiographic class.—A measure of soil and water conditions that affect tree growth on a site. The physiographic classes are:

Xeric sites.—Very dry soils where excessive drainage seriously limits both growth and species occurrence. Example: sandy jack pine plains.

Xeromesic sites.—Moderately dry soils where excessive drainage limits growth and species occurrence to some extent. Example: dry oak ridge.

Mesic sites.—Deep, well-drained soils. Growth and species occurrence are limited only by climate.

Hydromesic sites.—Moderately wet soils where insufficient drainage or infrequent flooding limits growth and species occurrence to some extent. Example: better drained bottomland hardwood sites.

Hydric sites.—Very wet sites where excess water seriously limits both growth and species occurrence. Example: frequently flooded river bottoms and spruce bogs.

Plant byproducts.—Plant residues used for products such as mulch, pulp chips, and fuelwood.

Plant residues.—Wood and bark materials generated at manufacturing plants during production of other products.

Poletimber stands.—(See stand-size class.)

Poletimber trees.—Growing-stock trees of commercial species at least 5 inches d.b.h. but smaller than sawtimber size.

Productive-reserved forest land.—Forest land sufficiently productive to qualify as commercial forest land but withdrawn from timber utilization through statute, administration regulation, designation, or exclusive use for Christmas tree production, as indicated by annual shearing.

Productive-deferred.—Forest land sufficiently productive to qualify as commercial forest land but presently withdrawn from timber utilization because it is being considered for possible inclusion into the Wilderness system.

Rotten trees.—Live trees of commercial species that do not contain at least one 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, because they do not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of extra cull volume in a tree is rotten.

Rough trees.—(a) Live trees of commercial species that do not contain at least one merchantable 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, because they do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Roundwood products.—Logs, bolts, or other round sections (including chips from roundwood) cut from trees for industrial or consumer uses. (Note: Includes saw logs, veneer logs and bolts; cooperage logs and bolts; pulpwood;fuelwood; piling; poles; posts; hewn ties; mine timbers; and various other round, split, or hewn products.)

Salvable dead trees.—Standing or down dead trees considered merchantable by regional standards.

Saplings.—Live trees 1 to 5 inches d.b.h.

Sapling-seedling stands.—(See stand-size class.)

Saw log.—A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter outside bark (d.o.b.) for softwoods of 7 inches (9 inches for hardwoods) or other combinations of size and defect specified by regional standards.

Saw log portion.—That part of the bole of sawtimber trees between the stump and the saw log top.

Saw log top.—The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw log top is 7 inches d.o.b. for softwoods and 9 inches d.o.b. for hardwoods.

Sawtimber stands.—(See stand-size class.)

Sawtimber trees.—Growing-stock trees of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and

meeting regional specifications for freedom from defect. Softwoods must be at least 9 inches d.b.h. Hardwoods must be at least 11 inches d.b.h.

Sawtimber volume.—Net volume of the saw log portion of live sawtimber in board feet, International ¼-inch rule, from stump to a minimum 7 inches top diameter outside bark (d.o.b.) for softwoods and, a minimum 9 inches top d.o.b. for hardwoods.

Seedlings.—Live trees less than 1 inch d.b.h. that are expected to survive. Only softwood seedlings more than 6 inches tall and hardwood seedlings more than 1 foot tall are counted.

Short-log (rough tree).—Sawtimber-size trees of commercial species that contain at least one merchantable 8- to 11-foot saw log but not a 12-foot saw log.

Shrub biomass.—The total above-ground weight (including the bark) of selected shrubs and trees less than 1 inch d.b.h.

Site class.—A classification of forest land in terms of inherent capacity to grow crops of industrial wood based on fully stocked natural stands.

Site index.—An expression of forest site quality based on the height of a free-growing dominant or codominant tree of a representative species in the forest type at age 50.

Softwoods.—Coniferous trees, usually evergreen, having needles or scale-like leaves.

Stand.—A growth of trees on a minimum of 1 acre of forest land that is stocked by forest trees of any size.

Stand-age class.—Age of the main stand. Main stand refers to trees of the dominant forest type and stand-size class.

Stand-area class.—The extent of a continuous forested area of the same forest type, stand-size class, and stand-density class.

Stand-size class.—A classification of forest land based on the size class of growing-stock trees on the area; that is, sawtimber, poletimber, or seedlings and saplings.

a. *Sawtimber stands.*—Stands at least 16.7 percent stocked with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

b. *Poletimber stands.*—Stands at least 16.7 percent stocked with growing-stock trees of which half or more of this stocking is in poletimber and/or sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

c. *Sapling-seedling stands.*—Stands at least 16.7 percent stocked with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

d. *Nonstocked stands.*—Stands in which stocking of growing-stock trees is less than 16.7 percent.

State land.—Land either owned by States or leased to them, for 50 years or more.

Stocking.—The degree of occupancy of land by trees, measured by basal area and/or the number of trees in a stand by size or age and spacing, compared to the basal area and/or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

A stocking percent of 100 indicates full utilization of the site and is equivalent to 80 square feet of basal area per acre in trees 5 inches d.b.h. and larger. In a stand of trees less than 5 inches d.b.h., a stocking percent of 100 would indicate that the present number of trees is sufficient to produce 80 square feet of basal area per acre when the trees reach 5 inches d.b.h.

Stands are grouped into the following stocking classes:

Overstocked stands.—Stands in which stocking of trees is 134.0 percent or more.

Fully stocked stands.—Stands in which stocking of trees is from 101.0 to 133.9 percent.

Medium stocked stands.—Stands in which stocking of trees is from 61.0 to 100.9 percent.

Poorly stocked stands.—Stands in which stocking of trees is from 16.7 to 60.9 percent.

Nonstocked areas.—Commercial forest land on which stocking of trees is less than 16.7 percent.

Timber removals from growing stock.—The volume of sound wood in growing-stock trees removed annually for forest products (including roundwood products and logging residues) and for other removals.

Timber removals from sawtimber.—The net board-foot volume of live sawtimbertrees removed for forest products annually (including roundwood products and logging residues) and for other removals.

Timber products output.—All timber products cut from roundwood and byproducts of wood manufacturing plants. Roundwood products include logs, bolts, or other round sections cut from growing-stock trees, cull trees, salvable dead trees, trees on nonforest land, noncommercial species, sapling-size trees, and limbwood. Byproducts from primary manufacturing plants include slabs, edging, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and screenings of pulpmills that are used as pulpwood chips or other products.

Tree biomass.—The total aboveground weight (including the bark) of all trees from 1 to 5 inches in d.b.h., and the total aboveground weight (including the bark) from a 1-foot stump for trees more than 5 inches in diameter.

Tree size class.—A classification of trees based on diameter at breast height, including sawtimber trees, poletimber trees, saplings, and seedlings.

Unproductive forest land.—Forest land incapable of producing 20 cubic feet per acre of annual growth or of yielding crops of industrial wood under natural conditions because of adverse site conditions. (Note: Adverse conditions include shallow soil, dry climate, poor drainage, high elevation, steepness, and rockiness).

Upper stem portion.—That part of the bole of sawtimber trees above the saw log top to a minimum top diameter of 4 inches outside bark or to the point where the central stem breaks into limbs.

Urban and other areas.—Areas within the legal boundaries of cities and towns; suburban areas developed for residential, industrial, or recreational purposes; schoolyards, cemeteries, roads; railroads; airports; beaches; powerlines; and other rights-of-way; or other nonforest land not included in any other specified land use class.

Water.—(a) *Bureau of the Census.*—Permanent inland water surfaces, such as lakes, reservoirs, and ponds at least 40 acres in area; and streams, sloughs, estuaries, and canals at least one-eighth of a statute mile wide.

(b) Noncensus.—Permanent inland water surfaces, such as lakes, reservoirs, and ponds from 1 to 39.9 acres in area; and streams, sloughs, estuaries, and canals from 120 feet to one-eighth of a statute mile wide.

Wooded pasture.—Improved pasture with more than 16.7 percent stocking in live trees but less than 25 percent stocking in growing-stock trees. Area is currently improved for grazing or there is other evidence of grazing.

Wooded strip.—An acre or more of natural continuous forest land that would otherwise meet survey standards for commercial forest land except that it is less than 120 feet wide.

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Table 1.--Area of land by land class, Northeast Unit, Wisconsin, 1968 and 1983

(In thousand acres)

Land class	1968	1983
Forest land		
Commercial forest land		
Jack pine	130.7	81.7
Red pine	122.2	157.8
White pine	64.1	81.1
Balsam fir	280.5	187.9
White spruce	29.5	19.8
Black spruce	132.1	147.5
Northern white-cedar	166.8	186.0
Tamarack	68.6	63.0
Oak-hickory	212.2	149.3
Elm-ash-soft maple	261.4	235.9
Maple-birch	1,189.1	1,280.2
Aspen	1,196.0	1,026.7
Paper birch	154.6	191.5
Nonstocked	54.2	20.1
Subtotal	4,062.0	3,828.5
Noncommercial forest land		
Unproductive	151.2	140.8
Productive-reserved	1.8	52.0
Subtotal	153.0	192.8
Total	4,215.0	4,021.3
Nonforest land		
Cropland	751.4	748.6
Pasture and range	86.6	209.3
Other	628.8	721.0
Total	1,466.8	1,678.9
Total land	5,681.8	5,700.2
Water (Bureau of the Census)	261.3[1/]	262.8[2/]
Total land and water	5,943.1[1/]	5,963.0[2/]

[1/] U.S. Department of Commerce, Bureau of Census, 1960.

[2/] U.S. Department of Commerce, Bureau of Census, 1980.

Table 2.--Area of land by land use class and county, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Species group	All counties	County									
		Florence	Forest	Langlade	Lincoln	Menominee	Marinette	Oconto	Oneida	Shawano	Vilas
Forest land											
Commercial forest	3,828.5	244.0	492.7	374.5	393.8	213.1	639.7	347.1	497.1	255.2	371.3
Unproductive forest	140.8	3.5	34.8	17.2	16.7	--	16.7	6.6	34.0	4.0	7.3
Productive reserved	52.0	6.7	16.4	--	0.7	--	4.6	3.7	--	--	19.9
Total	4,021.3	254.2	543.9	391.7	411.2	213.1	661.0	357.4	531.1	259.2	398.5
Nonforest land											
Nonforest with trees											
Cropland with trees	3.9	--	--	--	1.3	--	1.3	--	--	1.3	--
Improved pasture with trees	34.7	2.2	2.0	3.2	1.2	--	3.1	6.8	2.8	12.1	1.3
Wooded strips	5.8	--	--	--	1.8	--	--	1.9	--	2.1	--
Idle farmland with trees	21.5	--	--	--	--	--	5.3	9.3	--	4.0	2.9
Marsh with trees	40.1	--	1.8	4.6	5.4	1.8	9.0	7.4	6.8	--	3.3
Urban and other with trees	56.4	1.8	--	0.7	9.1	--	11.1	--	18.3	3.3	12.1
Windbreaks	5.0	--	--	--	--	--	3.1	1.9	--	--	--
Subtotal	167.4	4.0	3.8	8.5	18.8	1.8	32.9	27.3	27.9	22.8	19.6
Nonforest without trees											
Cropland without trees	744.7	22.2	35.7	90.8	60.7	--	104.4	176.9	53.2	200.8	--
Improved pasture without trees	174.6	4.3	5.4	23.4	37.2	--	24.2	24.3	15.8	36.2	3.8
Idle farmland without trees	55.8	2.1	8.1	5.3	2.1	--	15.0	11.3	--	8.1	3.8
Marsh without trees	215.2	1.8	8.1	7.3	12.2	14.8	14.7	11.2	62.0	10.1	73.0
Other farm-farmstead	36.4	2.2	--	5.4	--	--	10.9	1.8	--	16.1	--
Urban and other	244.9	19.1	40.9	19.8	18.5	--	22.0	29.0	28.3	18.3	49.0
Noncensus water	39.9	0.9	1.2	6.8	6.4	--	8.0	2.2	4.9	2.4	7.1
Subtotal	1,511.5	52.6	99.4	158.8	137.1	14.8	199.2	256.7	164.2	292.0	136.7
Total	1,678.9	56.6	103.2	167.3	155.9	16.6	232.1	284.0	192.1	314.8	156.3
Total land	5,700.2	310.8	647.1	559.0	567.1	229.7	893.1	641.4	723.2	574.0	554.8
Water (Bureau of the Census)[1/]	262.8	7.4	22.8	9.3	14.2	4.0	23.0	9.6	68.1	8.1	96.3
Total land and water[1/]	5,963.0	318.2	669.9	568.3	581.3	233.7	916.1	651.0	791.3	582.1	651.1

[1/] U.S. Department of Commerce, Bureau of Census, 1980.

Table 3.--Area of commercial forest land by ownership class and county, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All counties	County									
		Florence	Forest	Langlade	Lincoln	Menominee	Marinette	Oconto	Oneida	Shawano	Vilas
National Forest	548.8	67.5	274.7	30.3	--	--	--	126.8	7.9	--	41.6
Miscellaneous federal	3.9	--	--	1.9	--	--	--	--	--	2.0	--
State	193.7	7.2	15.1	17.2	3.8	--	3.6	--	54.4	6.0	86.4
County and municipal	646.9	39.6	7.3	114.2	81.2	--	255.4	44.3	57.7	8.0	39.2
Indian	254.5	--	7.3	--	--	213.1	--	--	--	18.0	16.1
Forest industry	485.3	50.4	77.1	47.5	59.2	--	30.6	--	180.0	26.0	14.5
Farmer	381.6	9.0	5.6	55.1	57.1	--	52.7	74.4	8.5	119.2	--
Misc. private-corporation	163.1	12.7	11.1	5.7	5.5	--	36.1	7.6	39.1	4.0	41.3
Misc. private-individual	1,150.7	57.6	94.5	102.6	187.0	--	261.3	94.0	149.5	72.0	132.2
All owners	3,828.5	244.0	492.7	374.5	393.8	213.1	639.7	347.1	497.1	255.2	371.3

Table 4.--Area of commercial forest land by ownership class and site class, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
National Forest	548.8	--	--	47.3	165.0	239.7	96.8
Miscellaneous federal	3.9	--	--	--	1.9	2.0	--
State	193.7	--	--	3.4	27.1	86.8	76.4
County and municipal	646.9	--	--	10.9	140.7	288.0	207.3
Indian	254.5	--	--	7.2	52.1	133.7	61.5
Forest industry	485.3	--	--	16.1	109.0	219.3	140.9
Farmer	381.6	--	--	11.1	86.9	135.3	148.3
Misc. private-corporation	163.1	--	--	5.3	29.0	76.3	52.5
Misc. private-individual	1,150.7	--	2.0	42.1	251.3	503.1	352.2
All owners	3,828.5	--	2.0	143.4	863.0	1,684.2	1,135.9

Table 5.--Area of commercial forest land by ownership class and stand-volume class, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All classes	Stand-volume class (board feet[1/])		
		Less than 1,500	1,500 to 5,000	5,000+
National Forest	548.8	192.7	276.2	79.9
Miscellaneous federal	3.9	1.9	2.0	--
State	193.7	84.7	74.4	34.6
County and municipal	646.9	368.5	235.8	42.6
Indian	254.5	42.9	83.0	128.6
Forest industry	485.3	183.5	193.2	108.6
Farmer	381.6	159.6	153.7	68.3
Misc. private-corporation	163.1	71.9	73.5	17.7
Misc. private-individual	1,150.7	532.7	462.1	155.9
All owners	3,828.5	1,638.4	1,553.9	636.2

[1/] International 1/4-inch rule.

Table 6.--Area of privately owned commercial forest land by ownership class, owner tenure, and size of holding, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Ownership class and owner tenure class	All sizes	Size of holding (acres)								
		1-4	5-10	11-20	21-50	51-100	101-500	501-2,500	2,501-5,000	5001+
Forest industry										
1-4 years	36.9	--	--	--	--	--	--	11.2	--	25.7
5-9 years	53.8	--	--	--	--	1.7	--	1.6	1.7	48.8
10-19 years	118.0	--	--	--	--	--	--	1.9	--	116.1
20+ years	276.6	--	--	--	--	--	--	1.7	--	274.9
All classes	485.3	--	--	--	--	1.7	--	16.4	1.7	465.5
Farmer										
1-4 years	75.4	--	--	3.9	19.1	22.3	30.1	--	--	--
5-9 years	54.6	--	3.8	3.7	5.7	24.6	14.8	2.0	--	--
10-19 years	139.8	--	1.8	5.8	24.0	34.4	66.6	5.4	1.8	--
20+ years	111.8	--	-	3.9	27.1	35.9	41.3	1.9	1.7	--
All classes	381.6	--	5.6	17.3	75.9	117.2	152.8	9.3	3.5	--
Misc. priv.-corporation										
1-4 years	19.4	--	--	--	7.0	1.7	8.8	1.9	--	--
5-9 years	17.1	--	--	--	5.2	1.7	1.8	8.4	--	--
10-19 years	32.1	--	--	--	3.6	3.4	8.8	10.8	3.6	1.9
20+ years	94.5	--	--	3.9	1.8	10.9	10.5	41.0	--	26.4
All classes	163.1	--	--	3.9	17.6	17.7	29.9	62.1	3.6	28.3
Misc. priv.-individual										
1-4 years	261.8	6.9	15.8	10.3	105.5	58.4	56.1	6.9	--	1.9
5-9 years	264.1	6.8	10.3	12.3	88.5	79.0	56.9	10.3	--	--
10-19 years	341.6	10.4	13.1	10.7	116.7	68.6	101.2	17.5	3.4	--
20+ years	283.2	5.3	6.8	7.1	83.2	76.3	88.1	16.4	--	--
All classes	1,150.7	29.4	46.0	40.4	393.9	282.3	302.3	51.1	3.4	1.9
All private owners										
1-4 years	393.5	6.9	15.8	14.2	131.6	82.4	95.0	20.0	--	27.6
5-9 years	389.6	6.8	14.1	16.0	99.4	107.0	73.5	22.3	1.7	48.8
10-19 years	631.5	10.4	14.9	16.5	144.3	106.4	176.6	35.6	8.8	118.0
20+ years	766.1	5.3	6.8	14.9	112.1	123.1	139.9	61.0	1.7	301.3
All classes	2,180.7	29.4	51.6	61.6	487.4	418.9	485.0	138.9	12.2	495.7

Table 7.--Area of commercial forest land by forest type, stand-size class, and ownership class, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All owners	Ownership class								
		National Forest[1/]	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Jack pine										
Sawtimber	27.1	0.7	--	1.6	14.2	1.8	1.7	--	--	7.1
Poletimber	36.7	9.7	--	3.3	11.4	1.6	1.7	1.8	--	7.2
Sapling & seedling	17.9	0.5	--	5.1	3.4	--	--	--	1.7	7.2
All stands	81.7	10.9	--	10.0	29.0	3.4	3.4	1.8	1.7	21.5
Red pine										
Sawtimber	79.5	18.4	--	10.2	22.4	1.6	1.7	--	--	25.2
Poletimber	56.7	17.5	--	8.7	9.5	1.8	8.9	--	3.5	6.8
Sapling & seedling	21.6	10.5	--	1.7	2.0	--	7.0	--	--	0.4
All stands	157.8	46.4	--	20.6	33.9	3.4	17.6	--	3.5	32.4
White pine										
Sawtimber	58.7	5.9	--	1.7	8.5	12.2	1.7	9.2	5.1	14.4
Poletimber	15.6	2.0	--	1.6	--	1.8	1.7	--	5.3	3.2
Sapling & seedling	6.8	--	--	--	--	--	3.4	1.8	--	1.6
All stands	81.1	7.9	--	3.3	8.5	14.0	6.8	11.0	10.4	19.2
Balsam fir										
Sawtimber	34.9	2.3	--	1.9	1.8	--	10.4	--	--	18.5
Poletimber	91.7	22.7	--	3.4	20.5	--	3.5	1.9	5.1	34.6
Sapling & seedling	61.3	3.7	--	5.4	9.1	--	10.3	5.7	3.5	23.6
All stands	187.9	28.7	--	10.7	31.4	--	24.2	7.6	8.6	76.7
White spruce										
Sawtimber	9.3	9.3	--	--	--	--	--	--	--	--
Poletimber	5.5	--	--	--	--	--	1.7	--	--	3.8
Sapling & seedling	5.0	3.2	--	--	1.8	--	--	--	--	--
All stands	19.8	12.5	--	--	1.8	--	1.7	--	--	3.8
Black spruce										
Sawtimber	5.5	--	--	1.7	3.8	--	--	--	--	--
Poletimber	54.2	15.7	--	8.4	8.9	3.6	5.1	2.0	--	10.5
Sapling & seedling	87.8	2.0	--	14.0	19.5	--	18.7	7.8	3.4	22.4
All stands	147.5	17.7	--	24.1	32.2	3.6	23.8	9.8	3.4	32.9
Northern white-cedar										
Sawtimber	44.2	4.2	--	1.9	3.6	3.5	14.3	7.8	--	8.9
Poletimber	114.6	27.8	--	3.7	12.7	10.8	6.8	13.4	3.5	35.9
Sapling & seedling	27.2	3.0	--	--	5.5	1.7	1.7	8.0	--	7.3
All stands	186.0	35.0	--	5.6	21.8	16.0	22.8	29.2	3.5	52.1

(Table 7 continued on next page)

[1/] Northern white-cedar and tamarack forest types are classified as mixed swamp conifers in the Nicolet National Forest Land and Resource Management Plan. Other minor differences exist between these figures and those appearing in the Land and Resource Management Plan due to differences in sampling methods and intensities.

(Table 7 continued)

Forest type and stand-size class	All owners	Ownership class								
		National Forest [1/]	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Tamarack										
Sawtimber	1.7	--	--	--	--	--	1.7	--	--	--
Poletimber	27.5	4.0	--	1.9	--	--	3.6	1.8	1.7	14.5
Sapling & seedling	33.8	--	--	8.5	3.9	1.6	--	5.5	1.8	12.5
All stands	63.0	4.0	--	10.4	3.9	1.6	5.3	7.3	3.5	27.0
Oak-hickory										
Sawtimber	61.0	3.0	--	3.4	1.8	16.1	6.0	9.0	7.5	14.2
Poletimber	59.4	7.7	--	3.3	18.3	1.7	1.9	5.6	3.5	17.4
Sapling & seedling	28.9	--	--	--	12.6	1.8	--	1.8	1.8	10.9
All stands	149.3	10.7	--	6.7	32.7	19.6	7.9	16.4	12.8	42.5
Elm-ash-soft maple										
Sawtimber	71.5	0.4	--	--	12.9	9.2	1.8	23.1	--	24.1
Poletimber	113.3	2.2	--	1.7	21.9	1.8	8.9	28.7	3.6	44.5
Sapling & seedling	51.1	0.3	--	1.7	7.5	--	3.6	9.6	1.9	26.5
All stands	235.9	2.9	--	3.4	42.3	11.0	14.3	61.4	5.5	95.1
Maple-birch										
Sawtimber	510.4	62.3	--	24.2	12.5	103.9	108.0	72.7	8.5	118.3
Poletimber	626.7	161.7	--	10.3	95.7	33.5	97.0	45.9	29.1	153.5
Sapling & seedling	143.1	1.3	--	1.6	20.4	--	21.6	27.8	3.4	67.0
All stands	1,280.2	225.3	--	36.1	128.6	137.4	226.6	146.4	41.0	338.8
Aspen										
Sawtimber	127.1	13.1	--	8.5	17.8	3.5	15.8	7.4	3.6	57.4
Poletimber	483.4	64.0	2.0	15.4	116.0	25.0	26.6	42.9	23.2	168.3
Sapling & seedling	416.2	58.0	1.9	25.7	109.7	8.8	67.6	22.1	25.1	97.3
All stands	1,026.7	135.1	3.9	49.6	243.5	37.3	110.0	72.4	51.9	323.0
Paper birch										
Sawtimber	21.9	0.6	--	1.6	--	--	--	3.6	--	16.1
Poletimber	139.0	11.1	--	11.6	24.9	3.4	17.5	5.4	15.5	49.6
Sapling & seedling	30.6	--	--	--	10.6	--	--	5.5	--	14.5
All stands	191.5	11.7	--	13.2	35.5	3.4	17.5	14.5	15.5	80.2
Exotic										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--
Nonstocked	20.1	--	--	--	1.8	3.8	3.4	3.8	1.8	5.5
All types										
Sawtimber	1,052.8	120.2	--	56.7	99.3	151.8	163.1	132.8	24.7	304.2
Poletimber	1,824.3	346.1	2.0	73.3	339.8	85.0	184.9	149.4	94.0	549.8
Sapling & seedling	931.3	82.5	1.9	63.7	206.0	13.9	133.9	95.6	42.6	291.2
Nonstocked	20.1	--	--	--	1.8	3.8	3.4	3.8	1.8	5.5
All stands	3,828.5	548.8	3.9	193.7	646.9	254.5	485.3	381.6	163.1	1,150.7

[1/] Northern white-cedar and tamarack forest types are classified as mixed swamp conifers in the Nicolet National Forest Land and Resource Management Plan. Other minor differences exist between these figures and those appearing in the Land and Resource Management Plan due to differences in sampling methods and intensities.

Table 8.--Area of commercial forest land by forest type and county, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All counties	County									
		Florence	Forest	Langlade	Lincoln	Menominee	Marinette	Oconto	Oneida	Shawano	Vilas
Jack pine	81.7	--	--	3.9	5.6	1.8	25.5	10.8	11.3	2.0	20.8
Red pine	157.8	6.8	20.1	6.4	14.6	1.8	27.1	24.2	26.3	8.0	22.5
White pine	81.1	3.7	3.3	--	3.6	10.8	7.2	7.4	15.7	4.0	25.4
Balsam fir	187.9	10.9	38.8	33.2	29.8	--	16.5	5.5	34.0	4.0	15.2
White spruce	19.8	5.9	8.5	--	1.8	--	1.9	--	1.7	--	--
Black spruce	147.5	5.2	23.5	11.4	16.6	3.6	5.5	--	52.6	6.0	23.1
Northern white-cedar	186.0	6.7	31.5	13.4	--	10.6	43.7	33.6	22.0	18.0	6.5
Tamarack	63.0	4.0	5.6	11.5	5.6	--	3.6	1.8	18.7	4.0	8.2
Oak-hickory	149.3	7.2	--	--	3.7	17.9	61.6	21.7	8.5	14.0	14.7
Elm-ash-soft maple	235.9	1.8	10.4	17.1	33.5	9.0	52.6	38.9	13.6	54.0	5.0
Maple-birch	1,280.2	97.2	233.0	183.2	127.8	121.9	148.3	84.9	74.7	111.3	97.9
Aspen	1,026.7	80.2	100.7	86.8	125.4	32.1	211.8	92.5	167.0	25.9	104.3
Paper birch	191.5	10.8	17.3	7.6	23.9	1.8	32.6	20.2	47.6	2.0	27.7
Exotic	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	20.1	3.6	--	--	1.9	1.8	1.8	5.6	3.4	2.0	--
All types	3,828.5	244.0	492.7	374.5	393.8	213.1	639.7	347.1	497.1	255.2	371.3

Table 9.--Area of commercial forest land by county and stand-size class, Northeast Unit, Wisconsin, 1983

(In thousand acres)

County	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Florence	244.0	83.3	111.9	45.2	3.6
Forest	492.7	149.7	258.4	84.6	--
Langlade	374.5	85.8	215.8	72.9	--
Lincoln	393.8	61.1	195.8	135.0	1.9
Menominee	213.1	145.0	54.0	12.3	1.8
Marinette	639.7	136.0	309.5	192.4	1.8
Oconto	347.1	84.5	184.9	72.1	5.6
Oneida	497.1	93.9	211.3	188.5	3.4
Shawano	255.2	98.0	115.9	39.3	2.0
Vilas	371.3	115.5	166.8	89.0	--
All counties	3,828.5	1,052.8	1,824.3	931.3	20.1

Table 10.--Area of commercial forest land by forest type, stand-size class, and site class, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
Jack pine							
Sawtimber	27.1	--	--	--	--	21.8	5.3
Poletimber	36.7	--	--	--	7.8	14.7	14.2
Sapling & seedling	17.9	--	--	--	1.7	4.0	12.2
All stands	81.7	--	--	--	9.5	40.5	31.7
Red pine							
Sawtimber	79.5	--	--	26.9	25.3	25.3	2.0
Poletimber	56.7	--	--	18.5	27.6	9.0	1.6
Sapling & seedling	21.6	--	--	--	12.9	8.7	--
All stands	157.8	--	--	45.4	65.8	43.0	3.6
White pine							
Sawtimber	58.7	--	--	10.4	26.9	17.8	3.6
Poletimber	15.6	--	--	7.0	1.7	3.5	3.4
Sapling & seedling	6.8	--	--	1.8	1.7	3.3	--
All stands	81.1	--	--	19.2	30.3	24.6	7.0
Balsam fir							
Sawtimber	34.9	--	--	13.9	13.6	5.5	1.9
Poletimber	91.7	--	--	31.9	30.8	16.0	13.0
Sapling & seedling	61.3	--	2.0	12.9	21.2	7.5	17.7
All stands	187.9	--	2.0	58.7	65.6	29.0	32.6
White spruce							
Sawtimber	9.3	--	--	--	2.7	6.6	--
Poletimber	5.5	--	--	--	--	5.5	--
Sapling & seedling	5.0	--	--	--	1.8	1.6	1.6
All stands	19.8	--	--	--	4.5	13.7	1.6
Black spruce							
Sawtimber	5.5	--	--	--	--	--	5.5
Poletimber	54.2	--	--	--	3.3	9.6	41.3
Sapling & seedling	87.8	--	--	--	6.9	5.6	75.3
All stands	147.5	--	--	--	10.2	15.2	122.1
Northern white-cedar							
Sawtimber	44.2	--	--	--	1.9	9.0	33.3
Poletimber	114.6	--	--	--	--	27.6	87.0
Sapling & seedling	27.2	--	--	--	--	3.7	23.5
All stands	186.0	--	--	--	1.9	40.3	143.8

(Table 10 continued on next page)

(Table 10 continued)

Forest type and stand-size class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
Tamarack							
Sawtimber	1.7	--	--	--	--	--	1.7
Poletimber	27.5	--	--	--	--	12.7	14.8
Sapling & seedling	33.8	--	--	--	--	14.3	19.5
All stands	63.0	--	--	--	--	27.0	36.0
Oak-hickory							
Sawtimber	61.0	--	--	--	20.2	28.2	12.6
Poletimber	59.4	--	--	--	16.4	35.9	7.1
Sapling & seedling	28.9	--	--	--	10.9	12.6	5.4
All stands	149.3	--	--	--	47.5	76.7	25.1
Elm-ash-soft maple							
Sawtimber	71.5	--	--	--	5.6	16.8	49.1
Poletimber	113.3	--	--	--	10.9	30.2	72.2
Sapling & seedling	51.1	--	--	--	1.8	7.5	41.8
All stands	235.9	--	--	--	18.3	54.5	163.1
Maple-birch							
Sawtimber	510.4	--	--	3.8	86.0	283.2	137.4
Poletimber	626.7	--	--	1.9	121.0	368.2	135.6
Sapling & seedling	143.1	--	--	--	14.6	61.0	67.5
All stands	1,280.2	--	--	5.7	221.6	712.4	340.5
Aspen							
Sawtimber	127.1	--	--	--	63.6	59.8	3.7
Poletimber	483.4	--	--	9.3	203.5	214.4	56.2
Sapling & seedling	416.2	--	--	3.4	111.6	231.9	69.3
All stands	1,026.7	--	--	12.7	378.7	506.1	129.2
Paper birch							
Sawtimber	21.9	--	--	--	3.6	12.7	5.6
Poletimber	139.0	--	--	--	1.8	70.5	66.7
Sapling & seedling	30.6	--	--	--	2.0	16.1	12.5
All stands	191.5	--	--	--	7.4	99.3	84.8
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Nonstocked	20.1	--	--	1.7	1.7	1.9	14.8
All types							
Sawtimber	1,052.8	--	--	55.0	249.4	486.7	261.7
Poletimber	1,824.3	--	--	68.6	424.8	817.8	513.1
Sapling & seedling	931.3	--	2.0	18.1	187.1	377.8	346.3
Nonstocked	20.1	--	--	1.7	1.7	1.9	14.8
All stands	3,828.5	--	2.0	143.4	863.0	1,684.2	1,135.9

Table 11.--Area of commercial forest land by forest type and stand-age class, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	81.7	3.4	7.5	10.7	22.7	12.3	20.0	1.6	3.5	--	--	--	--	--
Red pine	157.8	10.7	20.1	27.4	50.4	25.4	3.3	5.3	3.2	3.4	5.4	3.2	--	--
White pine	81.1	5.0	1.8	6.8	6.7	5.3	12.0	1.9	12.3	10.9	2.0	3.6	5.8	7.0
Balsam fir	187.9	24.6	15.3	19.6	26.6	19.7	41.7	16.6	10.7	4.0	1.7	3.7	1.8	1.9
White spruce	19.8	1.8	6.8	--	--	2.7	8.5	--	--	--	--	--	--	--
Black spruce	147.5	14.4	20.6	38.7	10.6	10.2	10.4	12.5	19.3	5.3	3.6	--	1.9	--
Northern white-cedar	186.0	6.5	7.3	13.2	1.6	21.9	12.8	19.0	12.3	16.4	34.4	17.5	12.4	10.7
Tamarack	63.0	6.8	6.8	18.4	1.8	--	7.0	13.2	3.6	1.8	1.7	1.9	--	--
Oak-hickory	149.3	23.5	3.6	3.6	3.7	22.3	35.6	15.6	18.4	7.0	6.8	5.6	1.8	1.8
Elm-ash-soft maple	235.9	17.0	21.0	16.2	24.4	29.9	18.3	44.4	22.2	18.7	10.9	3.8	5.5	3.6
Maple-birch	1,280.2	61.7	59.3	49.7	79.0	228.4	226.5	158.2	69.8	70.6	45.1	82.9	62.3	86.7
Aspen	1,026.7	249.6	140.5	72.6	130.6	196.9	147.4	57.9	14.4	16.8	--	--	--	--
Paper birch	191.5	8.6	13.0	19.5	14.3	47.0	50.5	30.9	7.4	--	0.3	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	20.1	20.1	--	--	--	--	--	--	--	--	--	--	--	--
All types	3,828.5	453.7	323.6	296.4	372.4	622.0	594.0	377.1	197.1	154.9	111.9	122.2	91.5	111.7

Table 12.--Area of commercial forest land by forest type and site-index class, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All classes	Site-index class (feet)								
		11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91+
Jack pine	81.7	--	1.7	1.6	8.8	23.0	25.7	17.5	3.4	--
Red pine	157.8	--	--	--	3.6	29.3	53.7	51.3	19.9	--
White pine	81.1	--	--	1.7	10.3	19.6	26.7	12.2	10.6	--
Balsam fir	187.9	--	5.3	27.3	44.2	50.4	47.7	11.0	2.0	--
White spruce	19.8	--	--	--	5.4	8.3	--	6.1	--	--
Black spruce	147.5	--	38.3	46.6	37.2	15.2	6.8	3.4	--	--
Northern white-cedar	186.0	3.4	65.9	58.2	24.9	22.7	9.0	--	1.9	--
Tamarack	63.0	--	7.1	18.1	10.8	25.3	1.7	--	--	--
Oak-hickory	149.3	--	--	--	5.3	34.0	39.2	41.7	23.4	5.7
Elm-ash-soft maple	235.9	--	--	24.1	39.5	77.1	58.3	18.6	18.3	--
Maple-birch	1,280.2	--	--	11.3	73.3	255.9	446.1	362.1	114.6	16.9
Aspen	1,026.7	--	--	9.3	58.2	178.7	305.0	343.3	119.5	12.7
Paper birch	191.5	--	--	--	12.5	44.4	77.2	50.0	7.4	--
Exotic	--	--	--	--	--	--	--	--	--	--
Nonstocked	20.1	--	2.0	1.8	5.4	5.6	1.9	3.4	--	--
All types	3,828.5	3.4	120.3	200.0	339.4	789.5	1,099.0	920.6	321.0	35.3

Table 13.--Area of commercial forest land by forest type, stand-size class, and basal-area class, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	27.1	--	--	--	3.8	1.8	3.6	1.7	1.6	3.7	5.0	4.1	--	1.8	--
Poletimber	36.7	--	--	--	--	3.5	1.8	3.8	8.9	2.0	3.5	5.0	8.2	--	--
Sapling & seedling	17.9	1.8	--	1.8	3.4	4.1	--	3.4	3.4	--	--	--	--	--	--
All stands	81.7	1.8	--	1.8	7.2	9.4	5.4	8.9	13.9	5.7	8.5	9.1	8.2	1.8	--
Red pine															
Sawtimber	79.5	--	--	--	1.8	--	--	--	5.0	3.5	5.3	26.3	27.1	5.3	5.2
Poletimber	56.7	--	--	--	--	3.4	--	--	1.8	1.7	1.7	21.6	13.6	5.3	7.6
Sapling & seedling	21.6	7.1	1.8	2.5	1.8	1.7	3.4	--	--	1.7	1.6	--	--	--	--
All stands	157.8	7.1	1.8	2.5	3.6	5.1	3.4	--	6.8	6.9	8.6	47.9	40.7	10.6	12.8
White pine															
Sawtimber	58.7	--	--	1.9	--	1.7	3.4	1.7	1.6	5.0	7.3	12.2	7.8	7.2	8.9
Poletimber	15.6	--	--	--	--	1.7	--	--	3.4	1.8	3.4	1.6	3.7	--	--
Sapling & seedling	6.8	--	--	--	--	--	3.3	--	3.5	--	--	--	--	--	--
All stands	81.1	--	--	1.9	--	3.4	6.7	1.7	8.5	6.8	10.7	13.8	11.5	7.2	8.9
Balsam fir															
Sawtimber	34.9	--	--	--	--	2.1	3.4	3.6	2.9	3.6	4.9	5.3	5.5	--	3.6
Poletimber	91.7	--	--	--	--	3.5	--	1.7	5.7	7.2	1.9	23.3	32.2	7.3	8.9
Sapling & seedling	61.3	7.4	3.4	5.8	5.5	7.0	9.2	8.9	5.2	--	3.7	3.3	1.9	--	--
All stands	187.9	7.4	3.4	5.8	5.5	12.6	12.6	14.2	13.8	10.8	10.5	31.9	39.6	7.3	12.5
White spruce															
Sawtimber	9.3	--	--	--	--	--	--	2.7	--	--	--	--	--	6.6	--
Poletimber	5.5	--	--	--	--	--	--	--	--	3.8	--	1.7	--	--	--
Sapling & seedling	5.0	--	--	1.8	--	1.6	1.6	--	--	--	--	--	--	--	--
All stands	19.8	--	--	1.8	--	1.6	1.6	2.7	--	3.8	--	1.7	--	6.6	--
Black spruce															
Sawtimber	5.5	--	1.9	--	--	--	--	3.6	--	--	--	--	--	--	--
Poletimber	54.2	--	--	3.6	--	--	3.5	5.7	1.8	7.0	15.8	5.9	9.1	1.8	--
Sapling & seedling	87.8	5.5	5.4	23.0	3.7	12.3	5.4	8.4	13.8	5.1	1.7	3.5	--	--	--
All stands	147.5	5.5	7.3	26.6	3.7	12.3	8.9	17.7	15.6	12.1	17.5	9.4	9.1	1.8	--
Northern white-cedar															
Sawtimber	44.2	--	--	--	--	--	--	1.9	--	5.7	--	7.6	5.2	12.7	11.1
Poletimber	114.6	--	--	--	--	--	--	--	7.1	1.8	1.6	9.5	16.5	38.7	39.4
Sapling & seedling	27.2	1.8	2.2	3.7	0.9	5.3	--	--	5.7	--	--	4.0	--	3.6	--
All stands	186.0	1.8	2.2	3.7	0.9	5.3	--	1.9	12.8	7.5	1.6	21.1	21.7	55.0	50.5

(Table 13 continued on next page)

(Table 13 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	1.7	--	--	--	--	--	1.7	--	--	--	--	--	--	--	--
Poletimber	27.5	--	1.9	1.8	--	3.6	3.6	3.7	1.9	5.1	2.0	3.9	--	--	--
Sapling & seedling	33.8	10.3	5.2	--	3.5	3.5	3.8	--	5.6	--	1.9	--	--	--	--
All stands	63.0	10.3	7.1	1.8	3.5	7.1	9.1	3.7	7.5	5.1	3.9	3.9	--	--	--
Oak-hickory															
Sawtimber	61.0	--	--	--	5.4	--	--	2.0	9.0	1.8	3.5	12.2	19.9	5.5	1.7
Poletimber	59.4	--	--	1.8	--	1.9	1.9	1.8	5.7	3.6	6.9	14.4	18.1	3.3	--
Sapling & seedling	28.9	3.7	3.6	3.6	1.8	5.4	9.0	--	1.8	--	--	--	--	--	--
All stands	149.3	3.7	3.6	5.4	7.2	7.3	10.9	3.8	16.5	5.4	10.4	26.6	38.0	8.8	1.7
Elm-ash-soft maple															
Sawtimber	71.5	--	--	2.0	1.9	2.0	2.0	5.8	5.7	7.8	3.8	9.5	16.7	8.9	5.4
Poletimber	113.3	--	--	--	3.6	5.6	7.3	11.4	13.6	12.7	3.6	16.2	35.8	3.5	--
Sapling & seedling	51.1	7.7	5.8	7.5	5.8	7.5	5.5	3.8	3.5	--	3.7	0.3	--	--	--
All stands	235.9	7.7	5.8	9.5	11.3	15.1	14.8	21.0	22.8	20.5	11.1	26.0	52.5	12.4	5.4
Maple-birch															
Sawtimber	510.4	--	--	--	--	9.4	9.4	20.5	24.9	44.1	34.6	121.5	173.1	58.9	14.0
Poletimber	626.7	--	--	--	3.7	7.5	19.9	27.8	52.1	117.2	49.9	148.1	135.1	50.6	14.8
Sapling & seedling	143.1	11.1	14.1	14.4	9.4	13.5	22.1	9.2	18.2	5.6	5.4	11.0	5.5	3.6	--
All stands	1,280.2	11.1	14.1	14.4	13.1	30.4	51.4	57.5	95.2	166.9	89.9	280.6	313.7	113.1	28.8
Aspen															
Sawtimber	127.1	--	--	3.4	3.7	3.6	12.4	7.5	7.0	19.0	14.1	18.1	25.3	3.5	9.5
Poletimber	483.4	--	1.9	9.0	1.9	38.9	35.4	53.9	52.3	60.7	48.1	70.9	81.1	21.2	8.1
Sapling & seedling	416.2	62.9	47.0	64.7	40.0	53.4	57.5	24.2	31.0	15.7	14.3	3.7	--	1.8	--
All stands	1,026.7	62.9	48.9	77.1	45.6	95.9	105.3	85.6	90.3	95.4	76.5	92.7	106.4	26.5	17.6
Paper birch															
Sawtimber	21.9	--	--	1.8	--	3.7	--	--	--	1.7	1.8	7.1	2.1	3.7	--
Poletimber	139.0	--	--	--	1.6	3.7	3.5	5.3	7.0	15.5	5.3	35.4	39.3	20.7	1.7
Sapling & seedling	30.6	3.5	1.9	1.6	--	7.4	3.6	1.8	3.6	1.8	1.9	1.8	1.7	--	--
All stands	191.5	3.5	1.9	3.4	1.6	14.8	7.1	7.1	10.6	19.0	9.0	44.3	43.1	24.4	1.7
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	20.1	16.5	--	--	1.8	1.8	--	--	--	--	--	--	--	--	--
All types															
Sawtimber	1,052.8	--	1.9	9.1	16.6	24.3	35.9	51.0	57.7	95.9	80.3	223.9	282.7	114.1	59.4
Poletimber	1,824.3	--	3.8	16.2	10.8	73.3	76.9	115.1	161.3	240.1	143.7	357.5	392.7	152.4	80.5
Sapling & seedling	931.3	122.8	90.4	130.4	75.8	122.7	124.4	59.7	95.3	29.9	34.2	27.6	9.1	9.0	--
Nonstocked	20.1	16.5	--	--	1.8	1.8	--	--	--	--	--	--	--	--	--
All stands	3,828.5	139.3	96.1	155.7	105.0	222.1	237.2	225.8	314.3	365.9	258.2	609.0	684.5	275.5	139.9

Table 14.--Area of commercial forest land by stocking class of growing-stock trees and stand-size class, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Stocking class (percent)	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Less than 16.7	20.1	--	--	--	20.1
16.7 to 60.9	394.9	115.9	127.6	151.4	--
61.0 to 100.9	1,334.1	351.7	753.0	229.4	--
101.0 to 133.9	1,623.5	452.8	813.0	357.7	--
134.0+	455.9	132.4	130.7	192.8	--
All classes	3,828.5	1,052.8	1,824.3	931.3	20.1

Table 15.--Area of commercial forest land in plantations by forest type and stand-age class, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All ages	Stand-age class (years)						
		1-10	11-20	21-30	31-40	41-50	51-60	61+
Jack pine	22.4	--	2.3	3.5	10.8	--	5.8	--
Red pine	118.1	9.0	20.1	27.4	37.9	22.0	1.7	--
White pine	5.4	--	1.8	1.9	1.7	--	--	--
White spruce	16.2	1.8	5.1	--	--	2.7	6.6	--
All types	162.1	10.8	29.3	32.8	50.4	24.7	14.1	--

Table 16.--Area of commercial forest land with conifer understory by forest type and conifer understory species, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All species	Conifer understory species								
		White pine	Red pine	Jack pine	Balsam fir	White spruce	Black spruce	Hemlock	Northern white-cedar	Other softwoods
Jack pine	38.7	1.8	--	30.2	5.0	--	1.7	--	--	--
Red pine	76.4	8.6	10.7	1.7	45.4	8.4	1.6	--	--	--
White pine	49.4	21.0	1.7	--	24.9	--	--	1.8	--	--
Balsam fir	106.3	--	--	--	104.6	--	1.7	--	--	--
White spruce	5.0	--	--	--	--	5.0	--	--	--	--
Black spruce	97.1	--	--	--	33.1	--	60.5	--	--	3.5
Northern white-cedar	110.0	--	--	--	70.8	2.2	--	--	37.0	--
Tamarack	45.0	--	--	--	9.1	--	10.9	--	3.8	21.2
Oak-hickory	41.2	20.2	7.3	1.8	8.4	--	--	3.5	--	--
Elm-ash-soft maple	89.0	1.8	--	--	71.2	2.9	--	1.8	11.3	--
Maple-birch	348.8	40.8	8.7	1.7	226.7	10.7	1.9	52.9	3.6	1.8
Aspen	382.6	47.8	13.8	10.3	285.8	3.3	14.3	1.8	5.5	--
Paper birch	74.9	8.3	1.7	--	50.7	3.3	1.9	1.8	7.2	--
Exotic	--	--	--	--	--	--	--	--	--	--
Nonstocked	1.9	--	--	--	1.9	--	--	--	--	--
All types	1,466.3	150.3	43.9	45.7	937.6	35.8	94.5	63.6	68.4	26.5

Table 17.--Area of noncommercial forest land by ownership class, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All areas	Productive-reserved areas	Unproductive areas
National Forest	60.7	32.3[1/]	28.4
Miscellaneous federal	--	--	--
State	31.3	13.7	17.6
County and municipal	25.7	25.7	--
Indian	1.6	--	1.6
Forest industry	12.2	12.2	--
Farmer	6.1	6.1	--
Misc. private-corp.	3.6	3.6	--
Misc. private-indiv.	51.6	47.2	4.4
Total	192.8	140.8	52.0

[1/] Includes 16.8 thousand acres of productive-deferred areas.

Table 18.--Area of noncommercial forest land by forest type, Northeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All areas	Productive-reserved areas[1/]	Unproductive areas
Jack pine	2.0	2.0	--
Red pine	4.7	--	4.7
White pine	--	--	--
Balsam fir	7.1	7.1	--
White spruce	1.8	--	1.8
Black spruce	74.9	74.9	-
Northern white-cedar	16.2	13.4	2.8
Tamarack	10.5	10.5	-
Oak-hickory	23.5	22.2	1.3
Elm-ash-soft maple	16.2	--	16.2
Maple-birch	--	--	--
Aspen	27.9	3.4	24.5
Paper birch	0.7	--	0.7
Exotic	--	--	--
Nonstocked	7.3	7.3	--
All types	192.8	140.8	52.0

[1/] Includes 16.8 thousand acres of productive-deferred areas.

Table 19.--Number of all live trees on commercial forest land by species group and diameter class, Northeast Unit, Wisconsin, 1983

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods															
Jack pine	45,579	16,209	8,482	11,543	5,238	2,526	1,156	303	106	13	3	--	--	--	--
Red pine	59,612	12,464	13,521	15,326	9,220	4,500	2,387	730	651	434	199	133	47	--	--
White pine	37,962	16,295	8,187	4,479	2,819	1,771	1,320	953	617	604	313	215	313	74	2
White spruce	28,287	11,070	5,750	5,161	3,576	1,336	816	313	166	50	25	20	4	--	--
Black spruce	138,322	82,922	34,845	14,958	4,402	970	190	21	11	3	--	--	--	--	--
Balsam fir	300,894	182,415	61,684	36,212	13,055	5,295	1,662	323	238	10	--	--	--	--	--
Hemlock	33,160	11,413	6,153	3,959	3,330	2,621	1,891	1,446	811	719	362	214	224	17	--
Tamarack	47,222	25,291	13,078	5,915	2,298	421	188	27	--	4	--	--	--	--	--
Eastern redcedar	47	--	--	47	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	156,496	51,138	45,704	31,701	17,077	6,670	2,648	1,026	362	93	52	17	8	--	--
Other softwoods	74	--	--	--	--	19	42	--	13	--	--	--	--	--	--
Total	847,655	409,217	197,404	129,301	61,015	26,129	12,300	5,142	2,975	1,930	954	599	596	91	2
Hardwoods															
White oak	5,101	3,564	186	226	494	298	160	97	41	20	6	5	4	--	--
Select red oak	48,285	20,090	4,664	9,001	5,301	4,029	2,475	1,367	730	268	165	95	79	21	--
Other red oak	22,171	12,440	2,563	2,925	1,769	1,063	679	406	162	99	31	14	20	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hickory	3,658	402	1,519	941	559	80	98	56	--	--	--	--	3	--	--
Basswood	60,736	12,841	11,256	15,038	10,734	5,848	2,821	1,126	482	269	140	90	81	9	1
Beech	7,610	5,616	1,087	119	257	88	91	104	92	67	42	16	27	4	--
Yellow birch	41,384	15,570	12,858	5,454	2,946	1,848	1,073	587	422	335	132	75	72	12	--
Hard maple	340,908	172,803	76,629	44,905	24,238	10,736	4,631	2,628	1,693	1,149	684	379	400	33	--
Soft maple	298,110	170,533	69,755	31,597	15,701	6,520	2,319	944	319	220	121	32	44	5	--
Elm	75,357	43,882	15,119	6,998	3,548	2,494	1,472	729	546	294	132	64	73	6	--
Black ash	90,831	52,788	22,691	8,408	4,613	1,357	589	217	102	45	6	13	2	--	--
White & green ash	34,236	21,829	3,631	3,272	2,594	1,323	819	503	157	79	24	3	2	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	694	186	186	--	23	--	76	201	11	5	--	--	--	4	2
Willow	1,252	564	535	--	87	--	10	26	9	16	--	--	5	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	12,632	8,247	742	1,865	781	381	273	225	60	18	21	16	2	1	--
Bigtooth aspen	85,400	56,344	8,799	6,678	6,438	4,010	2,018	803	215	77	9	9	--	--	--
Quaking aspen	571,092	423,875	60,756	32,281	25,748	16,998	7,581	2,661	853	235	78	22	4	--	--
Paper birch	154,634	54,064	37,645	29,223	21,096	8,730	2,770	797	236	46	21	3	2	1	--
Black cherry	78,045	59,720	8,882	5,324	2,498	876	343	365	26	4	7	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Butternut	304	--	--	--	69	40	84	60	31	18	--	--	2	--	--
Other hardwoods	1,544	1,536	--	--	--	--	8	--	--	--	--	--	--	--	--
Noncommercial species	122,954	101,581	15,115	4,959	994	182	115	8	--	--	--	--	--	--	--
Total	2,056,938	1,238,475	354,618	209,214	130,488	66,901	30,505	13,910	6,187	3,264	1,619	836	822	96	3
All species	2,904,593	1,647,692	552,022	338,515	191,503	93,030	42,805	19,052	9,162	5,194	2,573	1,435	1,418	187	5

Table 20.--Number of growing-stock trees on commercial forest land by species group and diameter class, Northeast Unit, Wisconsin, 1983

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods															
Jack pine	41,763	15,147	8,104	9,912	4,943	2,289	1,026	257	78	4	3	--	--	--	--
Red pine	58,889	12,464	13,356	14,911	9,129	4,470	2,387	724	646	429	199	127	47	--	--
White pine	36,533	16,128	8,020	4,032	2,592	1,612	1,192	895	588	581	299	213	307	72	2
White spruce	27,668	11,070	5,750	5,161	3,079	1,241	807	313	152	46	25	20	4	--	--
Black spruce	136,345	81,840	34,317	14,735	4,313	924	181	21	11	3	--	--	--	--	--
Balsam fir	298,300	182,037	60,761	35,421	12,735	5,192	1,600	314	230	10	--	--	--	--	--
Hemlock	31,420	11,413	6,128	3,410	2,858	2,374	1,654	1,325	773	694	344	212	218	17	--
Tamarack	46,113	25,126	12,504	5,663	2,186	421	188	21	--	4	--	--	--	--	--
Northern white-cedar	143,918	49,684	42,495	28,399	14,841	5,344	1,924	842	273	66	30	14	6	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	820,949	404,909	191,435	121,644	56,676	23,867	10,959	4,712	2,751	1,837	900	586	582	89	2
Hardwoods															
White oak	4,617	3,363	--	200	470	287	140	91	33	20	6	5	2	--	--
Select red oak	45,579	20,090	4,485	7,491	4,880	3,798	2,388	1,193	672	252	150	92	68	20	--
Other red oak	19,809	12,254	1,833	2,295	1,440	886	552	297	120	78	28	14	12	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hickory	3,602	402	1,519	941	513	80	88	56	--	--	--	--	3	--	--
Basswood	57,297	12,841	10,884	12,791	10,349	5,605	2,729	1,090	470	249	126	80	75	8	--
Beech	6,584	5,244	537	119	257	88	69	89	75	40	35	11	20	--	--
Yellow birch	37,375	15,403	11,520	4,567	2,556	1,229	811	455	359	268	99	56	45	7	--
Hard maple	324,549	169,474	73,086	40,785	21,914	9,210	3,988	2,256	1,490	1,032	599	346	340	29	--
Soft maple	283,880	168,148	64,291	28,634	13,950	5,694	1,886	724	250	159	84	23	36	1	--
Elm	72,314	43,492	14,378	6,095	3,215	2,155	1,358	629	484	268	114	61	61	4	--
Black ash	85,873	52,065	19,907	7,716	4,139	1,148	528	211	97	41	6	13	2	--	--
White & green ash	33,137	21,433	3,445	2,959	2,436	1,303	809	496	157	70	24	3	2	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	694	186	186	--	23	--	76	201	11	5	--	--	--	4	2
Willow	685	564	--	--	62	--	10	26	9	12	--	--	2	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	12,584	8,247	742	1,865	781	366	240	225	60	18	21	16	2	1	--
Bigtooth aspen	82,675	55,831	8,799	5,956	5,518	3,715	1,882	714	188	66	3	3	--	--	--
Quaking aspen	558,910	421,801	58,795	29,435	24,022	15,017	6,669	2,254	706	153	46	10	2	--	--
Paper birch	148,411	53,344	36,370	27,178	19,876	8,097	2,550	745	198	38	10	3	2	--	--
Black cherry	71,591	58,556	6,760	3,261	1,838	593	292	258	26	--	7	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Butternut	298	--	--	--	69	40	84	60	27	18	--	--	--	--	--
Other hardwoods	1,544	1,536	--	--	--	--	8	--	--	--	--	--	--	--	--
Total	1,852,008	1,124,274	317,537	182,288	118,308	59,311	27,157	12,070	5,432	2,787	1,358	736	674	74	2
All species	2,672,957	1,529,183	508,972	303,932	174,984	83,178	38,116	16,782	8,183	4,624	2,258	1,322	1,256	163	4

Table 21.--Net volume of growing stock on commercial forest land by species group, Northeast Unit, Wisconsin, 1968 and 1983

(In thousand cubic feet)

Species group	1968[1/]	1983
Softwoods		
Jack pine	101,100	98,249
Red pine	118,600	264,500
White pine	200,000	208,242
White spruce	46,800	72,646
Black spruce	62,500	76,929
Balsam fir	204,500	235,337
Hemlock	229,400	188,149
Tamarack	25,500	38,276
Northern white-cedar	159,800	241,284
Other softwoods	--	--
Total	1,148,200	1,423,612
Hardwoods		
White oak	10,900	10,329
Select red oak	143,300	209,694
Other red oak	40,500	42,462
Hickory	4,600	10,553
Basswood	185,200	273,476
Beech	13,100	14,767
Yellow birch	97,100	89,587
Hard maple	439,000	639,062
Soft maple	194,000	298,795
Elm	212,000	116,361
Ash	127,000	152,703
Cottonwood	4,400	7,586
Willow	2,200	2,020
Balsam poplar	21,700	26,115
Bigtooth aspen	148,600	153,953
Quaking aspen	536,700	589,553
Paper birch	272,800	366,696
Black cherry	21,000	41,678
Butternut	3,500	4,970
Other hardwoods	100	104
Total	2,477,700	3,050,464
All species	3,625,900	4,474,076

[1/] Figures have been adjusted from those published after the 1968 survey to conform to 1983 volumes because of changes in survey procedures.

Table 22.--Net volume of all live trees on commercial forest land by species group and diameter class, Northeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods													
Jack pine	108,609	31,938	27,622	22,596	16,403	6,370	3,109	397	174	--	--	--	--
Red pine	267,118	54,880	54,000	43,059	36,452	16,510	20,708	18,246	10,920	8,224	4,119	--	--
White pine	216,957	6,180	12,506	15,351	20,626	23,149	21,727	28,329	19,458	17,304	36,148	15,683	496
White spruce	76,470	10,664	18,696	13,761	13,486	8,184	5,898	2,237	1,546	1,609	389	--	--
Black spruce	78,118	38,308	24,672	10,666	3,380	507	433	152	--	--	--	--	--
Balsam fir	240,064	72,272	70,279	53,262	26,847	8,268	8,650	486	--	--	--	--	--
Hemlock	195,989	5,159	12,440	19,727	23,621	28,508	23,335	28,623	18,062	14,117	19,671	2,726	--
Tamarack	39,417	18,003	13,496	4,253	2,972	533	--	160	--	--	--	--	--
Northern white-cedar	271,548	74,433	78,557	52,592	31,630	18,914	8,996	3,054	1,906	931	535	--	--
Eastern redcedar	53	53	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	921	--	--	137	462	--	322	--	--	--	--	--	--
Total	1,495,264	311,890	312,268	235,404	175,879	110,943	93,178	81,684	52,066	42,185	60,862	18,409	496
Hardwoods													
White oak	11,191	537	2,001	2,459	1,954	1,818	1,012	706	219	270	215	--	--
Select red oak	225,018	27,985	31,877	40,394	38,317	29,979	21,782	10,519	8,209	5,828	6,456	3,672	--
Other red oak	52,482	6,912	8,523	9,233	9,084	7,860	4,112	3,226	1,349	739	1,444	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hickory	10,882	3,621	3,396	787	1,601	1,226	--	--	--	--	251	--	--
Basswood	285,351	39,581	63,055	61,060	46,183	27,168	15,476	11,220	7,370	5,700	6,986	1,484	68
Beech	17,756	440	1,702	971	1,490	2,408	2,757	2,612	2,013	870	2,077	416	--
Yellow birch	108,126	9,207	14,488	15,814	15,045	12,099	12,138	12,696	5,951	4,402	5,003	1,283	--
Hard maple	702,384	132,125	138,985	105,319	72,251	59,238	52,700	46,092	34,808	24,412	32,045	4,409	--
Soft maple	335,768	98,648	91,955	63,923	34,085	19,099	8,649	7,873	5,684	1,698	3,522	632	--
Elm	129,677	10,885	16,009	21,175	21,152	15,893	16,164	11,510	6,306	3,986	5,651	946	--
Black ash	87,713	31,429	26,175	12,598	8,098	4,064	2,819	1,451	236	712	131	--	--
White & green ash	73,918	10,444	15,943	13,260	13,102	11,541	4,982	2,966	1,308	203	169	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	7,586	--	146	--	1,160	4,692	344	186	--	--	--	482	576
Willow	2,340	--	400	--	167	600	299	564	--	--	310	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	26,542	3,542	4,245	3,716	4,062	5,765	1,917	690	1,154	1,104	181	166	--
Bigtooth aspen	164,626	19,255	37,917	43,194	33,851	19,393	7,101	3,211	290	414	--	--	--
Quaking aspen	631,740	114,009	157,625	163,795	109,082	53,258	22,762	7,389	2,828	768	224	--	--
Paper birch	389,410	108,484	130,806	85,186	39,818	16,173	6,231	1,548	767	158	134	105	--
Black cherry	56,818	19,553	15,331	8,675	5,033	7,044	734	138	310	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--	--	--
Butternut	5,162	--	469	436	1,381	1,268	899	645	--	--	64	--	--
Other hardwoods	104	--	--	--	104	--	--	--	--	--	--	--	--
Noncommercial species	15,246	8,648	3,917	1,379	1,175	127	--	--	--	--	--	--	--
Total	3,339,840	645,305	764,965	653,374	458,195	300,713	182,878	125,242	78,802	51,264	64,863	13,595	644
All species	4,835,104	957,195	1,077,233	888,778	634,074	411,656	276,056	206,926	130,868	93,449	125,725	32,004	1,140

Table 23.--Net volume of timber on commercial forest land by class of timber and softwoods and hardwoods, Northeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Live trees			
Growing-stock trees			
Poletimber	2,486,561	594,913	1,891,648
Sawtimber			
Saw log portion	1,387,795	644,524	743,271
Upper stem portion	599,720	184,175	415,545
Subtotal	1,987,515	828,699	1,158,816
Total growing stock	4,474,076	1,423,612	3,050,464
Cull trees			
Rough and rotten cull trees			
Poletimber	202,000	29,599	172,401
Sawtimber	112,657	33,120	79,537
Subtotal	314,657	62,719	251,938
Short-log trees	46,371	8,933	37,438
Total cull	361,028	71,652	289,376
All live trees	4,835,104	1,495,264	3,339,840
Salvable dead trees			
Growing-stock trees	79,937	19,387	60,550
Cull trees	1,914	351	1,563
All salvable dead trees	81,851	19,738	62,113
All classes	4,916,955	1,515,002	3,401,953

Table 24.--Net volume of all live trees by individual species, Northeast Unit, Wisconsin, 1983

Species	All live trees				Saw-log size trees		
	Total all live	Growing stock	Short-log cull	Rough and rotten cull	Total saw log	Sawtimber	Short-log
	-Thousand cubic feet-				-Thousand board feet[1]-		
Softwoods							
Jack pine	108,609	98,249	854	9,506	230,136	227,227	2,909
Red pine	267,118	264,500	172	2,446	902,735	902,043	692
White pine	216,957	208,242	1,216	7,499	1,036,500	1,032,510	3,990
White spruce	76,470	72,646	118	3,706	223,953	223,435	518
Black spruce	78,118	76,929	192	997	65,709	65,215	494
Balsam fir	240,064	235,337	482	4,245	423,418	422,051	1,367
Hemlock	195,989	188,149	2,617	5,223	778,976	772,542	6,434
Tamarack	39,417	38,276	--	1,141	41,560	41,560	--
Northern white-cedar	271,548	241,284	3,282	26,982	521,991	510,669	11,322
Eastern redcedar	53	--	--	53	--	--	--
Scotch pine	921	--	--	921	--	--	--
Total	1,495,264	1,423,612	8,933	62,719	4,224,978	4,197,252	27,726
Hardwoods							
White oak	7,024	6,426	239	359	16,781	16,126	655
Bur oak	4,167	3,903	196	68	13,141	12,611	530
Northern red oak	225,018	209,694	3,823	11,501	574,416	565,970	8,446
Northern pin oak	49,639	39,789	1,636	8,214	96,744	93,054	3,690
Black oak	2,843	2,673	--	170	12,362	12,362	--
Bitternut hickory	10,882	10,553	--	329	14,715	14,715	--
American basswood	285,351	273,476	1,494	10,381	565,504	562,327	3,177
Beech	17,756	14,767	1,087	1,902	62,232	59,359	2,873
Yellow birch	108,126	89,587	4,250	14,289	283,145	272,974	10,171
Sugar maple	702,384	639,062	9,734	53,588	1,492,957	1,469,909	23,048
Red maple	334,891	298,043	4,446	32,402	362,058	349,884	12,174
Silver maple	877	752	--	125	1,471	1,471	--
American elm	114,124	101,899	3,618	8,607	295,648	286,711	8,937
Slippery elm	3,917	3,518	167	232	12,681	12,262	419
Rock elm	11,636	10,944	--	692	25,054	25,054	--
Black ash	87,713	81,141	312	6,260	100,249	99,241	1,008
White ash	53,409	52,390	--	1,019	123,482	123,482	--
Green ash	20,509	19,172	63	1,274	56,144	55,959	185
Eastern cottonwood	7,586	7,586	--	--	30,690	30,690	--
Black willow	2,340	2,020	--	320	7,351	7,351	--
Balsam poplar	26,542	26,115	--	427	64,911	64,911	--
Bigtooth aspen	164,626	153,953	721	9,952	277,416	276,262	1,154
Quaking aspen	631,740	589,553	2,204	39,983	879,319	874,391	4,928
Paper birch	389,410	366,696	2,020	20,694	306,579	301,063	5,516
Black cherry	56,818	41,678	1,428	13,712	64,220	60,306	3,914
Butternut	5,162	4,970	--	192	22,406	22,406	--
Boxelder	104	104	--	--	577	577	--
Total	3,324,594	3,050,464	37,438	236,692	5,762,253	5,671,428	90,825
All species[2]	4,819,858	4,474,076	46,371	299,411	9,987,231	9,868,680	118,551

[1] International 1/4-inch rule.

[2] These totals do not include volume for noncommercial species. Volumes for individual noncommercial species are found in Table 25.

Table 25.--Net volume of noncommercial species on commercial forest land by individual species, Northeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Species	Cull volume
Eastern hophornbeam	11,241
Pincherry	197
Chokecherry	3,737
Peachleaf willow	71
All species	15,246

Table 26.--Net volume of growing stock on commercial forest land by species group and county, Northeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All counties	County									
		Florence	Forest	Langlade	Lincoln	Menominee	Marinette	Oconto	Oneida	Shawano	Vilas
Softwoods											
Jack pine	98,249	493	--	1,131	8,219	4,012	24,005	10,350	20,100	5,287	24,652
Red pine	264,500	8,916	24,182	6,596	28,539	2,270	41,542	38,703	52,281	18,358	43,113
White pine	208,242	5,947	6,046	2,949	6,469	59,365	28,822	23,579	30,416	11,899	32,750
White spruce	72,646	8,916	26,628	4,341	2,313	201	15,583	2,505	7,685	1,306	3,168
Black spruce	76,929	3,106	16,847	6,017	3,518	7,579	6,307	--	21,137	2,185	10,233
Balsam fir	235,337	16,690	54,487	33,638	23,806	2,598	28,194	6,641	41,889	5,899	21,495
Hemlock	188,149	22,179	40,050	5,168	6,428	66,763	11,704	7,407	9,843	5,414	13,193
Tamarack	38,276	4,310	2,639	7,808	1,366	1,102	4,825	3,985	5,006	3,809	3,426
Northern white-cedar	241,284	10,035	40,372	12,929	3,594	24,734	51,464	41,084	17,126	28,968	10,978
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	1,423,612	80,592	211,251	80,577	84,252	168,624	212,446	134,254	205,483	83,125	163,008
Hardwoods											
White oak	10,329	--	--	291	109	2,987	3,935	200	--	998	1,809
Select red oak	209,694	7,865	2,757	7,343	14,214	34,389	40,767	23,901	27,117	22,132	29,209
Other red oak	42,462	1,254	--	--	--	3,956	25,761	4,849	1,114	4,981	547
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	10,553	--	--	776	158	1,853	1,429	251	--	6,086	--
Basswood	273,476	22,434	73,341	52,195	17,878	28,854	24,451	19,411	6,785	19,329	8,798
Beech	14,767	--	774	--	--	8,004	766	609	--	4,614	--
Yellow birch	89,587	13,647	19,771	9,073	4,441	19,073	2,555	2,356	4,110	5,186	9,375
Hard maple	639,062	56,515	141,136	97,931	39,455	68,751	45,369	22,236	27,946	62,048	77,675
Soft maple	298,795	7,060	16,497	29,685	31,845	20,873	67,649	35,444	35,957	26,661	27,124
Elm	116,361	7,296	18,268	16,356	10,998	8,674	14,570	15,146	2,951	20,327	1,775
Black ash	81,141	593	8,983	5,027	10,556	5,793	16,363	10,680	7,487	14,646	1,013
White & green ash	71,562	1,130	11,049	7,308	9,912	4,660	8,832	13,385	1,039	13,594	653
Sycamore	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	7,586	--	--	158	--	--	1,058	5,113	--	1,257	--
Willow	2,020	--	--	--	--	--	304	1,113	--	603	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	26,115	491	4,253	1,942	--	239	13,398	1,503	1,766	2,523	--
Bigtooth aspen	153,953	6,466	1,681	12,219	6,361	10,684	34,698	32,495	15,898	5,436	28,015
Quaking aspen	589,553	59,249	74,477	70,863	72,611	21,484	96,937	42,199	72,770	18,824	60,139
Paper birch	366,696	18,409	49,861	23,394	33,986	9,361	53,702	33,847	72,881	9,838	61,417
Black cherry	41,678	1,631	14,076	8,860	5,008	821	3,977	1,395	986	3,909	1,015
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Butternut	4,970	--	1,036	--	--	369	129	1,057	--	2,379	--
Other hardwoods	104	--	--	--	--	104	--	--	--	--	--
Total	3,050,464	204,040	437,960	343,421	257,532	250,929	456,650	267,190	278,807	245,371	308,564
All species	4,474,076	284,632	649,211	423,998	341,784	419,553	669,096	401,444	484,290	328,496	471,572

Table 27.--Net volume of sawtimber on commercial forest land by species group and county, Northeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All counties	County									
		Florence	Forest	Langlade	Lincoln	Menominee	Marinette	Oconto	Oneida	Shawano	Vilas
Softwoods											
Jack pine	227,227	1,967	--	2,558	18,016	11,431	68,472	12,101	39,810	8,169	64,703
Red pine	902,043	38,357	127,245	33,453	46,644	13,090	106,455	98,219	218,867	10,374	209,339
White pine	1,032,510	30,314	32,034	8,769	34,080	323,462	132,215	119,414	142,234	53,226	156,762
White spruce	223,435	35,242	65,536	15,936	11,718	857	36,872	10,587	26,309	6,365	14,013
Black spruce	65,215	3,796	13,529	9,552	3,626	5,829	6,214	--	13,457	616	8,596
Balsam fir	422,051	25,923	125,929	56,752	27,630	2,924	43,906	12,904	73,000	11,043	42,040
Hemlock	772,542	98,777	165,993	20,841	24,216	290,399	46,660	22,009	35,318	13,853	54,476
Tamarack	41,560	3,808	2,870	5,967	2,897	4,636	6,264	1,546	3,521	6,565	3,486
Northern white-cedar	510,669	30,802	100,084	23,913	6,247	83,130	94,722	63,280	42,063	39,120	27,308
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	4,197,252	268,986	633,220	177,741	175,074	735,758	541,780	340,060	594,579	149,331	580,723
Hardwoods											
White oak	28,737	--	--	--	--	9,097	8,263	984	--	3,654	6,739
Select red oak	565,970	15,691	10,789	20,857	29,172	129,246	78,568	37,685	78,583	78,925	86,454
Other red oak	105,416	2,739	--	--	--	14,650	59,476	12,085	1,950	12,685	1,831
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	14,715	--	--	--	740	3,829	678	1,188	--	8,280	--
Basswood	562,327	47,884	142,210	86,299	29,003	112,148	38,825	18,154	16,591	49,234	21,979
Beech	59,359	--	3,868	--	--	30,446	1,566	836	--	22,643	--
Yellow birch	272,974	53,675	67,999	21,036	12,453	55,778	4,886	5,369	14,823	4,940	32,015
Hard maple	1,469,909	140,374	276,188	216,967	56,853	248,699	77,457	22,442	34,169	220,968	175,792
Soft maple	351,355	9,757	30,969	35,995	36,555	28,572	66,711	48,376	21,424	54,724	18,272
Elm	324,027	16,901	40,435	35,219	35,661	32,955	35,594	50,817	8,605	64,813	3,027
Black ash	99,241	684	11,816	4,586	19,982	12,877	11,395	12,452	9,026	14,893	1,530
White & green ash	179,441	4,047	35,626	19,238	17,424	4,688	14,764	42,682	2,901	37,148	923
Sycamore	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	30,690	--	--	649	--	--	4,968	20,399	--	4,674	--
Willow	7,351	--	--	--	--	--	655	4,164	--	2,532	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	64,911	744	8,787	3,931	--	--	36,237	5,082	5,843	4,287	--
Bigtooth aspen	276,262	13,678	1,238	25,903	9,436	19,325	53,511	61,237	26,892	12,914	52,128
Quaking aspen	874,391	75,544	156,161	73,109	97,890	32,543	147,346	56,640	104,640	25,864	104,634
Paper birch	301,063	25,296	54,897	13,535	16,177	9,896	25,340	28,007	48,315	8,602	70,998
Black cherry	60,306	752	29,379	10,978	879	2,886	3,150	2,327	--	9,023	932
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Butternut	22,406	--	3,462	--	--	1,929	747	5,217	--	11,051	--
Other hardwoods	577	--	--	--	--	577	--	--	--	--	--
Total	5,671,428	407,766	873,824	568,302	362,225	750,141	670,137	436,143	373,762	651,874	577,254
All species	9,868,680	676,752	1,507,044	746,043	537,299	1,485,899	1,211,917	776,203	968,341	801,205	1,157,977

[1/] International 1/4-inch rule.

Table 28.--Net volume of growing stock on commercial forest land by species group and diameter class, Northeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods													
Jack pine	98,249	28,010	26,225	20,789	14,982	5,532	2,412	125	174	--	--	--	--
Red pine	264,500	53,583	53,529	42,750	36,452	16,471	20,570	18,074	10,920	8,032	4,119	--	--
White pine	208,242	5,704	11,597	14,267	18,912	21,976	20,813	27,475	18,832	17,133	35,565	15,472	496
White spruce	72,646	10,664	16,424	12,834	13,368	8,184	5,473	2,155	1,546	1,609	389	--	--
Black spruce	76,929	38,040	24,287	10,264	3,246	507	433	152	--	--	--	--	--
Balsam fir	235,337	71,028	69,062	52,304	26,018	8,087	8,352	486	--	--	--	--	--
Hemlock	188,149	4,779	11,202	18,528	22,066	27,297	22,572	27,854	17,651	14,071	19,403	2,726	--
Tamarack	38,276	17,476	12,946	4,253	2,972	469	--	160	--	--	--	--	--
Northern white-cedar	241,284	68,844	71,204	45,528	25,834	16,958	7,641	2,526	1,408	865	476	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	1,423,612	298,128	296,476	221,517	163,850	105,481	88,266	79,007	50,531	41,710	59,952	18,198	496
Hardwoods													
White oak	10,329	469	1,913	2,377	1,717	1,723	813	706	219	270	122	--	--
Select red oak	209,694	24,368	29,757	38,500	37,115	26,537	20,668	10,077	7,695	5,677	5,797	3,503	--
Other red oak	42,462	5,427	7,057	7,727	7,608	6,011	3,175	2,666	1,202	739	850	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hickory	10,553	3,621	3,141	787	1,527	1,226	--	--	--	--	251	--	--
Basswood	273,476	35,632	61,174	58,987	44,885	26,486	15,308	10,659	6,956	5,309	6,665	1,415	--
Beech	14,767	440	1,702	971	1,120	2,222	2,454	1,769	1,839	582	1,668	--	--
Yellow birch	89,587	7,899	13,039	11,265	12,266	10,133	10,869	10,892	4,927	3,558	3,777	962	--
Hard maple	639,062	122,952	128,163	93,205	64,092	52,604	47,806	42,753	31,694	22,966	28,878	3,949	--
Soft maple	298,795	91,038	83,150	57,209	29,536	15,637	7,355	6,206	4,209	1,346	2,983	126	--
Elm	116,361	9,246	14,496	18,549	19,768	13,905	14,580	10,561	5,593	3,824	5,160	679	--
Black ash	81,141	29,336	23,920	11,132	7,462	4,024	2,779	1,409	236	712	131	--	--
White & green ash	71,562	9,559	15,041	13,122	13,045	11,396	4,982	2,737	1,308	203	169	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	7,586	--	146	--	1,160	4,692	344	186	--	--	--	482	576
Willow	2,020	--	282	--	167	600	299	520	--	--	152	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	26,115	3,542	4,245	3,574	3,777	5,765	1,917	690	1,154	1,104	181	166	--
Bigtooth aspen	153,953	17,558	34,675	41,348	32,363	18,174	6,498	2,907	172	258	--	--	--
Quaking aspen	589,553	107,027	151,277	152,671	101,082	48,298	20,642	5,758	2,156	486	156	--	--
Paper birch	366,696	102,238	124,280	80,251	37,158	15,311	5,387	1,353	426	158	134	--	--
Black cherry	41,678	12,978	11,637	6,336	4,385	5,298	734	--	310	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--	--	--
Butternut	4,970	--	469	436	1,381	1,268	771	645	--	--	--	--	--
Other hardwoods	104	--	--	--	104	--	--	--	--	--	--	--	--
Total	3,050,464	583,330	709,564	598,447	421,718	271,310	167,381	112,494	70,096	47,192	57,074	11,282	576
All species	4,474,076	881,458	1,006,040	819,964	585,568	376,791	255,647	191,501	120,627	88,902	117,026	29,480	1,072

Table 29.--Net volume of sawtimber on commercial forest land by species group and diameter class, Northeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods											
Jack pine	227,227	107,540	76,831	28,690	12,584	657	925	--	--	--	--
Red pine	902,043	247,160	207,482	93,621	117,050	103,376	62,813	46,557	23,984	--	--
White pine	1,032,510	56,852	88,297	111,128	111,111	151,604	106,507	98,941	210,521	94,449	3,100
White spruce	223,435	57,805	64,521	41,648	28,567	11,493	8,370	8,852	2,179	--	--
Black spruce	65,215	43,799	15,651	2,597	2,332	836	--	--	--	--	--
Balsam fir	422,051	216,730	119,805	39,736	43,238	2,542	--	--	--	--	--
Hemlock	772,542	65,897	89,770	119,161	103,018	130,866	84,701	68,644	96,600	13,885	--
Tamarack	41,560	22,247	15,861	2,560	--	892	--	--	--	--	--
Northern white-cedar	510,669	221,294	130,936	88,490	40,910	13,726	7,792	4,823	2,698	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	4,197,252	1,039,324	809,154	527,631	458,810	415,992	271,108	227,817	335,982	108,334	3,100
Hardwoods											
White oak	28,737	--	9,580	8,777	4,042	3,397	1,062	1,291	588	--	--
Select red oak	565,970	--	178,066	126,306	99,210	48,792	37,837	28,206	29,377	18,176	--
Other red oak	105,416	--	36,063	28,134	15,062	12,657	5,756	3,583	4,161	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	14,715	--	7,580	5,947	--	--	--	--	1,188	--	--
Basswood	562,327	--	210,140	124,710	73,572	51,933	34,299	26,482	33,876	7,315	--
Beech	59,359	--	5,969	11,289	12,313	8,884	9,309	2,998	8,597	--	--
Yellow birch	272,974	--	49,856	45,431	52,062	54,627	25,710	18,997	20,793	5,498	--
Hard maple	1,469,909	--	300,717	254,366	237,050	216,985	163,679	120,595	154,719	21,798	--
Soft maple	351,355	--	164,753	80,929	36,140	29,453	19,613	6,244	13,635	588	--
Elm	324,027	--	82,862	59,199	63,966	47,145	25,505	17,701	24,343	3,306	--
Black ash	99,241	--	47,823	23,750	14,919	7,347	1,222	3,548	632	--	--
White & green ash	179,441	--	74,206	59,452	24,680	13,214	6,172	933	784	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	30,690	--	4,820	18,683	1,429	790	--	--	--	2,210	2,758
Willow	7,351	--	706	2,490	1,260	2,203	--	--	692	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	64,911	--	15,215	24,897	8,711	3,281	5,583	5,455	909	860	--
Bigtooth aspen	276,262	--	144,712	84,354	30,917	14,122	857	1,300	--	--	--
Quaking aspen	874,391	--	477,442	241,704	108,274	31,275	12,043	2,752	901	--	--
Paper birch	301,063	--	182,895	78,336	28,492	7,327	2,352	890	771	--	--
Black cherry	60,306	--	25,913	29,083	3,753	--	1,557	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Butternut	22,406	--	7,999	7,008	4,087	3,312	--	--	--	--	--
Other hardwoods	577	--	577	--	--	--	--	--	--	--	--
Total	5,671,428	--	2,027,894	1,314,845	819,939	556,744	352,556	240,975	295,966	59,751	2,758
All species	9,868,680	1,039,324	2,837,048	1,842,476	1,278,749	972,736	623,664	468,792	631,948	168,085	5,858

[1/] International 1/4-inch rule.

Table 30.--Net volume of growing stock on commercial forest land by species group and forest type, Northeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	98,249	63,447	12,008	5,449	237	--	366	417
Red pine	264,500	4,270	192,529	15,483	2,008	--	2,465	163
White pine	208,242	1,701	12,245	88,695	5,583	603	2,354	6,902
White spruce	72,646	--	1,115	2,206	13,814	18,592	--	3,095
Black spruce	76,929	212	613	2,528	14,074	--	37,377	12,028
Balsam fir	235,337	--	1,921	4,936	68,312	560	18,079	19,539
Hemlock	188,149	--	1,074	2,637	4,621	131	1,059	6,592
Tamarack	38,276	--	--	112	1,964	--	3,892	5,825
Northern white-cedar	241,284	--	153	2,158	23,237	--	2,461	153,554
Other softwoods	--	--	--	--	--	--	--	--
Total	1,423,612	69,630	221,658	124,204	133,850	19,886	68,053	208,115
Hardwoods								
White oak	10,329	--	--	624	--	--	--	--
Select red oak	209,694	180	1,076	2,078	231	--	587	168
Other red oak	42,462	1,299	2,006	375	99	--	--	132
Select hickory	--	--	--	--	--	--	--	--
Other hickory	10,553	--	--	--	--	--	--	251
Basswood	273,476	--	--	416	--	299	--	--
Beech	14,767	--	--	--	--	--	--	--
Yellow birch	89,587	--	144	--	2,168	--	259	3,599
Hard maple	639,062	--	898	345	933	280	126	--
Soft maple	298,795	104	964	5,228	6,307	--	897	3,440
Elm	116,361	--	1,256	--	530	150	--	1,243
Black ash	81,141	--	--	294	2,537	--	--	9,573
White & green ash	71,562	--	887	--	--	--	--	273
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	7,586	--	--	4,493	--	--	--	--
Willow	2,020	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	26,115	--	--	--	1,282	325	200	1,037
Bigtooth aspen	153,953	1,471	1,183	542	1,133	--	846	1,027
Quaking aspen	589,553	4,160	13,188	12,026	16,303	3,074	10,569	4,979
Paper birch	366,696	1,132	2,715	6,805	10,689	--	2,446	9,356
Black cherry	41,678	--	180	--	664	113	151	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	4,970	--	--	--	--	--	--	--
Other hardwoods	104	--	--	--	--	--	--	--
Total	3,050,464	8,346	24,497	33,226	42,876	4,241	16,081	35,078
All species	4,474,076	77,976	246,155	157,430	176,726	24,127	84,134	243,193

(Table 30 continued on next page)

(Table 30 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods								
Jack pine	--	3,090	--	1,111	11,829	147	--	148
Red pine	192	6,836	--	7,163	23,793	9,598	--	--
White pine	1,837	6,967	5,305	53,765	15,436	6,849	--	--
White spruce	177	--	2,912	6,789	19,421	4,525	--	--
Black spruce	2,377	--	789	1,943	4,132	856	--	--
Balsam fir	1,822	65	18,182	40,356	46,921	14,571	--	73
Hemlock	--	422	9,452	157,915	2,710	1,536	--	--
Tamarack	19,623	421	1,165	3,826	644	804	--	--
Northern white-cedar	744	--	17,229	26,439	9,486	5,823	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	26,772	17,801	55,034	299,307	134,372	44,709	--	221
Hardwoods								
White oak	--	5,817	781	1,435	1,672	--	--	--
Select red oak	120	92,464	1,773	58,654	33,502	18,861	--	--
Other red oak	--	25,162	668	3,851	8,021	518	--	331
Select hickory	--	--	--	--	--	--	--	--
Other hickory	--	2,647	--	7,376	279	--	--	--
Basswood	--	4,411	4,361	253,071	8,972	1,946	--	--
Beech	--	299	554	13,914	--	--	--	--
Yellow birch	--	278	3,411	76,449	1,720	1,559	--	--
Hard maple	--	8,284	3,420	588,205	30,199	6,372	--	--
Soft maple	754	14,977	42,246	135,003	66,937	21,938	--	--
Elm	--	663	23,877	81,484	6,581	577	--	--
Black ash	--	--	48,888	15,314	4,390	145	--	--
White & green ash	--	1,228	18,330	46,039	4,075	730	--	--
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	1,257	1,058	778	--	--	--
Willow	--	--	1,684	150	--	186	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	--	--	4,460	2,865	14,849	1,097	--	--
Bigtooth aspen	488	5,681	1,321	28,244	104,701	7,316	--	--
Quaking aspen	909	7,422	13,720	100,904	371,127	30,993	--	179
Paper birch	2,848	15,316	10,087	84,779	91,866	128,657	--	--
Black cherry	--	1,001	613	25,217	12,971	768	--	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	--	--	--	3,415	1,555	--	--	--
Other hardwoods	--	--	--	104	--	--	--	--
Total	5,119	185,650	181,451	1,527,531	764,195	221,663	--	510
All species	31,891	203,451	236,485	1,826,838	898,567	266,372	--	731

Table 31.--Net volume of sawtimber on commercial forest land by species group and forest type, Northeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

ecies group	All types	Forest type: Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
ftwoods								
Jack pine	227,227	133,403	20,507	20,914	1,258	--	710	--
Red pine	902,043	16,939	558,139	73,975	11,548	--	12,708	911
White pine	1,032,510	4,999	52,748	449,452	28,477	3,330	8,839	33,379
White spruce	223,435	--	4,627	10,723	44,764	45,339	--	8,487
Black spruce	65,215	488	--	4,406	14,399	--	20,335	14,077
Balsam fir	422,051	--	2,007	8,801	102,564	1,661	68,837	18,661
Hemlock	772,542	--	2,339	10,464	19,498	648	4,634	23,356
Tamarack	41,560	--	--	--	5,166	--	1,204	4,166
Northern white-cedar	510,669	--	782	9,149	62,957	--	5,980	256,847
Other softwoods	--	--	--	--	--	--	--	--
Total	4,197,252	155,829	641,149	587,884	290,631	50,978	123,247	359,884
rdwoods								
White oak	28,737	--	--	829	--	--	--	--
Select red oak	565,970	876	2,587	8,469	628	--	805	881
Other red oak	105,416	2,285	2,770	934	--	--	--	677
Select hickory	--	--	--	--	--	--	--	--
Other hickory	14,715	--	--	--	--	--	--	1,188
Basswood	562,327	--	--	1,402	--	--	--	--
Beech	59,359	--	--	--	--	--	--	--
Yellow birch	272,974	--	611	--	8,888	--	1,291	9,352
Hard maple	1,469,909	--	734	--	2,572	1,507	698	--
Soft maple	351,355	--	--	14,269	6,390	--	2,106	2,181
Elm	324,027	--	--	--	2,352	663	--	4,433
Black ash	99,241	--	--	--	5,450	--	--	10,916
White & green ash	179,441	--	5,114	--	--	--	--	1,570
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	30,690	--	--	17,855	--	--	--	--
Willow	7,351	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	64,911	--	--	--	626	705	--	2,999
Bigtooth aspen	276,262	3,005	2,431	1,693	1,006	--	3,259	1,520
Quaking aspen	874,391	7,138	22,125	21,896	14,742	692	19,803	7,187
Paper birch	301,063	1,655	3,746	16,888	5,455	--	3,157	5,480
Black cherry	60,306	--	--	--	1,886	752	--	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	22,406	--	--	--	--	--	--	--
Other hardwoods	577	--	--	--	--	--	--	--
Total	5,671,428	14,959	40,118	84,235	49,995	4,319	31,119	48,384
l species	9,868,680	170,788	681,267	672,119	340,626	55,297	154,366	408,268

(Table 31 continued on next page)

[1/] International 1/4-inch rule.

(Table 31 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods								
Jack pine	--	9,300	--	2,660	37,710	765	--	--
Red pine	1,112	27,601	--	35,128	110,593	53,389	--	--
White pine	6,298	37,711	25,695	273,383	77,676	30,523	--	--
White spruce	902	--	9,916	28,147	60,008	10,522	--	--
Black spruce	3,481	--	1,686	2,437	3,906	--	--	--
Balsam fir	1,315	--	20,995	87,880	84,652	24,678	--	--
Hemlock	--	1,773	29,958	663,840	11,170	4,862	--	--
Tamarack	12,664	2,251	4,880	7,869	1,399	1,961	--	--
Northern white-cedar	1,693	--	41,113	101,663	14,182	16,303	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	27,465	78,636	134,243	1,203,007	401,296	143,003	--	--
Hardwoods								
White oak	--	17,524	3,654	2,197	4,533	--	--	--
Select red oak	595	218,883	5,238	196,546	75,460	55,002	--	--
Other red oak	--	67,060	1,190	12,437	18,063	--	--	--
Select hickory	--	--	--	--	--	--	--	--
Other hickory	--	--	--	13,527	--	--	--	--
Basswood	--	10,625	11,893	519,531	15,275	3,601	--	--
Beech	--	--	1,042	58,317	--	--	--	--
Yellow birch	--	1,393	8,062	239,167	2,768	1,442	--	--
Hard maple	--	16,981	6,720	1,419,485	13,122	8,090	--	--
Soft maple	1,248	18,118	82,960	175,070	33,477	15,536	--	--
Elm	--	--	78,307	218,243	19,321	708	--	--
Black ash	--	--	59,249	21,492	2,134	--	--	--
White & green ash	--	3,361	60,610	98,202	8,379	2,205	--	--
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	4,674	4,968	3,193	--	--	--
Willow	--	--	6,563	--	--	788	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	--	--	14,171	12,039	34,371	--	--	--
Bigtooth aspen	1,358	21,562	3,660	69,409	155,566	11,793	--	--
Quaking aspen	878	11,150	20,905	209,326	490,022	48,527	--	--
Paper birch	1,475	12,851	11,414	111,214	45,062	82,666	--	--
Black cherry	--	1,847	1,997	32,366	21,458	--	--	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	--	--	--	14,513	7,893	--	--	--
Other hardwoods	--	--	--	577	--	--	--	--
Total	5,554	401,355	382,309	3,428,626	950,097	230,358	--	--
All species	33,019	479,991	516,552	4,631,633	1,351,393	373,361	--	--

Table 32.--Net volume of growing stock on commercial forest land by species group and ownership class, Northeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All owners	Ownership class								
		National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Softwoods										
Jack pine	98,249	9,663	--	10,937	26,621	5,949	8,728	6,282	2,110	27,959
Red pine	264,500	56,083	--	24,498	60,422	5,681	22,227	5,346	9,432	80,811
White pine	208,242	18,092	--	15,429	19,927	63,673	11,302	25,120	9,016	45,683
White spruce	72,646	27,840	200	2,229	11,520	280	9,906	2,373	1,514	16,784
Black spruce	76,929	14,136	--	8,884	12,182	7,812	13,398	3,630	1,044	15,843
Balsam fir	235,337	38,770	--	10,849	39,541	3,613	40,247	13,814	12,177	76,326
Hemlock	188,149	25,996	--	3,193	8,527	68,432	39,504	9,446	9,484	23,567
Tamarack	38,276	4,280	--	2,222	4,988	1,218	3,998	3,654	372	17,544
Northern white-cedar	241,284	37,663	--	9,465	31,347	29,263	28,449	40,390	3,743	60,964
Other softwoods	--	--	--	--	--	--	--	--	--	--
Total	1,423,612	232,523	200	87,706	215,075	185,921	177,759	110,055	48,892	365,481
Hardwoods										
White oak	10,329	--	--	--	291	2,987	230	2,242	82	4,497
Select red oak	209,694	18,356	--	21,315	26,969	37,193	21,394	15,648	13,376	55,443
Other red oak	42,462	--	--	808	12,949	3,956	--	6,166	7,251	11,332
Select hickory	--	--	--	--	--	--	--	--	--	--
Other hickory	10,553	--	--	--	--	1,993	2,064	3,636	133	2,727
Basswood	273,476	70,295	--	2,970	29,244	35,899	56,387	17,306	3,993	57,382
Beech	14,767	--	--	--	--	8,369	974	3,694	--	1,730
Yellow birch	89,587	15,898	--	3,325	3,456	19,962	23,583	5,425	3,777	14,161
Hard maple	639,062	133,305	--	15,863	40,329	76,507	138,314	68,529	26,836	139,379
Soft maple	298,795	25,441	--	14,868	56,550	25,570	26,723	46,868	14,120	88,655
Elm	116,361	15,474	--	3,771	10,283	9,154	19,220	16,847	1,277	40,335
Black ash	81,141	7,523	131	367	11,926	6,046	9,302	18,207	521	27,118
White & green ash	71,562	9,965	--	514	8,686	6,646	10,733	17,540	1,797	15,681
Sycamore	--	--	--	--	--	--	--	--	--	--
Cottonwood	7,586	--	--	--	158	--	--	1,058	4,493	1,877
Willow	2,020	--	--	--	150	--	--	606	--	1,264
Hackberry	--	--	--	--	--	--	--	--	--	--
Balsam poplar	26,115	2,740	--	464	7,012	239	637	6,176	--	8,847
Bigtooth aspen	153,953	16,790	--	4,908	21,651	12,846	10,437	12,308	16,268	58,745
Quaking aspen	589,553	88,179	2,489	28,844	105,945	27,598	51,089	48,150	23,433	213,826
Paper birch	366,696	33,781	--	29,627	56,690	15,510	29,911	30,559	26,417	144,201
Black cherry	41,678	11,493	--	1,035	6,634	1,108	6,430	4,450	1,597	8,931
Black walnut	--	--	--	--	--	--	--	--	--	--
Butternut	4,970	849	--	--	131	984	480	935	181	1,410
Other hardwoods	104	--	--	--	--	104	--	--	--	--
Total	3,050,464	450,089	2,620	128,679	399,054	292,671	407,908	326,350	145,552	897,541
All species	4,474,076	682,612	2,820	216,385	614,129	478,592	585,667	436,405	194,444	1,263,022

Table 33.--Net volume of sawtimber on commercial forest land by species group and ownership class, Northeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All owners	Ownership class								
		National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Softwoods										
Jack pine	227,227	23,086	--	19,252	60,635	20,296	15,522	17,739	8,000	62,697
Red pine	902,043	257,250	--	89,604	143,906	31,807	68,234	23,401	22,115	265,726
White pine	1,032,510	97,788	--	74,082	96,407	344,053	51,288	117,967	41,834	209,091
White spruce	223,435	77,483	665	6,254	32,587	857	36,001	9,913	5,544	54,131
Black spruce	65,215	8,301	--	2,793	17,892	5,829	14,647	2,428	704	12,621
Balsam fir	422,051	112,179	--	15,462	50,501	4,995	95,177	19,582	19,219	104,936
Hemlock	772,542	110,133	--	10,743	29,759	294,329	173,097	29,442	37,878	87,161
Tamarack	41,560	3,808	--	--	4,492	4,636	1,940	6,990	654	19,040
Northern white-cedar	510,669	61,093	--	26,880	60,147	89,630	99,806	66,574	10,204	96,335
Other softwoods	--	--	--	--	--	--	--	--	--	--
Total	4,197,252	751,121	665	245,070	496,326	796,432	555,712	294,036	146,152	911,738
Hardwoods										
White oak	28,737	--	--	--	--	9,097	679	4,661	--	14,300
Select red oak	565,970	18,853	--	60,353	56,193	133,207	61,615	50,846	35,734	149,169
Other red oak	105,416	--	--	--	22,440	14,650	--	19,386	18,738	30,202
Select hickory	--	--	--	--	--	--	--	--	--	--
Other hickory	14,715	--	--	--	--	3,829	2,296	4,204	678	3,708
Basswood	562,327	114,652	--	5,656	35,523	121,118	101,282	58,780	6,146	119,170
Beech	59,359	--	--	--	--	32,273	3,868	17,909	--	5,309
Yellow birch	272,974	53,444	--	14,254	11,272	56,412	83,199	10,620	12,173	31,600
Hard maple	1,469,909	203,550	--	39,287	37,459	258,396	370,826	236,028	40,849	283,514
Soft maple	351,355	29,769	--	14,611	42,162	31,615	30,461	86,808	7,318	108,611
Elm	324,027	33,259	--	12,321	24,765	34,211	48,347	49,784	1,264	120,076
Black ash	99,241	4,551	--	742	13,320	14,487	14,427	17,700	1,659	32,355
White & green ash	179,441	30,435	--	2,940	30,083	7,344	30,823	41,277	1,049	35,490
Sycamore	--	--	--	--	--	--	--	--	--	--
Cottonwood	30,690	--	--	--	649	--	--	4,968	17,855	7,218
Willow	7,351	--	--	--	--	--	--	1,966	--	5,385
Hackberry	--	--	--	--	--	--	--	--	--	--
Balsam poplar	64,911	6,199	--	1,542	13,639	--	2,588	17,425	--	23,518
Bigtooth aspen	276,262	36,053	--	11,241	27,567	24,595	16,758	21,357	27,092	111,599
Quaking aspen	874,391	160,475	896	42,581	135,142	45,682	96,481	77,544	23,088	292,502
Paper birch	301,063	33,715	--	23,884	38,594	18,510	28,782	22,096	14,724	120,758
Black cherry	60,306	25,482	--	--	8,403	2,886	6,856	8,317	--	8,362
Black walnut	--	--	--	--	--	--	--	--	--	--
Butternut	22,406	4,839	--	--	--	3,866	1,788	3,965	976	6,972
Other hardwoods	577	--	--	--	--	577	--	--	--	--
Total	5,671,428	755,276	896	229,412	497,211	812,755	901,076	755,641	209,343	1,509,818
All species	9,868,680	1,506,397	1,561	474,482	993,537	1,609,187	1,456,788	1,049,677	355,495	2,421,556

[1/] International 1/4-inch rule.

Table 34.--Net volume of growing stock on commercial forest land by forest type and stand-age class, Northeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	77,976	1,372	1,004	6,800	28,173	8,716	24,421	1,432	6,058	--	--	--	--	--
Red pine	246,155	4,103	8,587	47,697	82,041	49,562	3,960	12,782	7,498	8,089	13,289	8,547	--	--
White pine	157,430	4,368	1,551	11,457	6,648	8,625	14,739	251	28,875	26,413	3,276	7,446	16,049	27,732
Balsam fir	176,726	8,586	5,741	8,027	20,334	27,642	55,499	17,527	14,676	6,822	1,311	5,539	3,503	1,519
White spruce	24,127	373	4,536	--	--	2,476	16,742	--	--	--	--	--	--	--
Black spruce	84,134	1,894	3,741	10,015	2,324	7,595	6,713	9,099	31,990	7,398	2,996	--	369	--
Northern white-cedar	243,193	1,507	4,483	7,174	2,407	19,890	19,361	31,005	19,027	15,577	50,660	25,665	24,312	22,125
Tamarack	31,891	2,783	--	4,626	665	--	5,248	12,142	3,096	2,086	--	1,245	--	--
Oak-hickory	203,451	6,958	2,339	1,773	4,726	24,219	51,650	22,662	37,511	13,981	14,010	15,821	3,197	4,604
Elm-ash-soft maple	236,485	5,660	5,055	9,247	22,316	28,654	21,010	50,962	29,196	22,223	20,636	6,232	8,092	7,202
Maple-birch	1,826,838	20,511	22,903	40,747	88,453	311,597	313,430	250,873	113,035	114,151	89,285	163,786	105,210	192,857
Aspen	898,567	72,804	46,729	56,290	139,934	255,714	203,395	75,606	24,840	23,255	--	--	--	--
Paper birch	266,372	3,873	6,801	19,046	19,015	64,587	78,896	56,703	16,736	--	715	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	731	731	--	--	--	--	--	--	--	--	--	--	--	--
All types	4,474,076	135,523	113,470	222,899	417,036	809,277	815,064	541,044	332,538	239,995	196,178	234,281	160,732	256,039

Table 35.--Net volume of sawtimber on commercial forest land by forest type and stand-age class, Northeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	170,788	2,138	2,230	4,988	44,058	25,944	66,262	5,430	19,738	--	--	--	--	--
Red pine	681,267	16,800	9,665	27,868	216,167	169,623	13,445	47,140	37,369	40,522	64,957	37,711	--	--
White pine	672,119	20,024	5,965	42,692	16,617	29,675	52,663	1,198	127,355	114,288	15,548	24,528	73,293	148,273
Balsam fir	340,626	14,115	4,629	11,484	31,787	55,856	108,292	23,250	23,127	21,624	6,701	19,786	12,667	7,308
White spruce	55,297	--	8,290	--	--	7,211	39,796	--	--	--	--	--	--	--
Black spruce	154,366	1,935	9,107	11,168	803	7,344	5,926	8,641	92,694	7,211	8,333	--	1,204	--
Northern white-cedar	408,268	1,820	5,417	11,925	4,530	24,398	24,171	25,813	24,927	17,230	63,868	55,325	66,788	82,056
Tamarack	33,019	3,159	--	4,005	654	--	6,402	16,408	551	560	--	1,280	--	--
Oak-hickory	479,991	19,422	4,102	5,569	15,312	26,994	68,689	51,638	120,206	36,066	51,082	52,177	9,106	19,628
Elm-ash-soft maple	516,552	14,489	6,717	8,865	27,905	48,606	37,448	112,556	65,451	60,818	64,458	18,435	28,282	22,522
Maple-birch	4,631,633	24,912	42,473	48,300	125,784	450,334	508,162	535,145	329,806	400,004	316,361	630,361	415,566	804,425
Aspen	1,351,393	100,976	57,601	65,638	184,470	301,205	327,728	165,701	78,391	69,683	--	--	--	--
Paper birch	373,361	5,216	5,701	17,172	20,993	68,745	117,442	93,440	42,838	--	1,814	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All types	9,868,680	225,006	161,897	259,674	689,080	1,215,935	1,376,426	1,086,360	962,453	768,006	593,122	839,603	606,906	1,084,212

[1/] International 1/4-inch rule.

Table 36.--Net volume of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Northeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)						
		0-10	11-20	21-30	31-40	41-50	51-60	61-70
Jack pine								
Sawtimber	32,730	--	--	--	2,105	970	2,593	3,127
Poletimber	39,982	--	--	--	--	1,813	1,360	2,844
Sapling & seedling	5,264	--	--	92	821	985	--	1,204
All stands	77,976	--	--	92	2,926	3,768	3,953	7,175
Red pine								
Sawtimber	134,422	--	--	--	978	--	--	--
Poletimber	105,610	--	--	--	--	480	--	--
Sapling & seedling	6,123	--	132	--	1,014	1,440	2,361	--
All stands	246,155	--	132	--	1,992	1,920	2,361	--
White pine								
Sawtimber	130,216	--	--	251	--	1,165	2,786	2,205
Poletimber	21,295	--	--	--	--	--	--	--
Sapling & seedling	5,919	--	--	--	--	--	2,773	--
All stands	157,430	--	--	251	--	1,165	5,559	2,205
Balsam fir								
Sawtimber	45,371	--	--	--	--	875	3,100	2,893
Poletimber	108,942	--	--	--	--	1,199	--	1,145
Sapling & seedling	22,413	104	406	1,270	1,381	2,385	4,313	4,231
All stands	176,726	104	406	1,270	1,381	4,459	7,413	8,269
White spruce								
Sawtimber	17,715	--	--	--	--	--	--	2,476
Poletimber	5,086	--	--	--	--	--	--	--
Sapling & seedling	1,326	--	--	373	--	304	649	--
All stands	24,127	--	--	373	--	304	649	2,476
Black spruce								
Sawtimber	3,413	--	369	--	--	--	--	3,044
Poletimber	62,747	--	--	1,241	--	--	2,267	4,081
Sapling & seedling	17,974	--	44	2,418	478	2,050	1,151	1,636
All stands	84,134	--	413	3,659	478	2,050	3,418	8,761
Northern white-cedar								
Sawtimber	79,240	--	--	--	--	--	--	--
Poletimber	155,750	--	--	--	--	--	--	--
Sapling & seedling	8,203	--	--	400	234	2,122	--	--
All stands	243,193	--	--	400	234	2,122	--	--

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine							
Sawtimber	1,432	5,561	7,056	5,460	--	4,426	--
Poletimber	6,565	2,887	4,174	5,631	14,708	--	--
Sapling & seedling	2,162	--	--	--	--	--	--
All stands	10,159	8,448	11,230	11,091	14,708	4,426	--
Red pine							
Sawtimber	5,927	4,988	7,914	45,495	42,735	11,915	14,470
Poletimber	1,344	5,096	1,774	29,589	28,993	14,132	24,202
Sapling & seedling	--	921	255	--	--	--	--
All stands	7,271	11,005	9,943	75,084	71,728	26,047	38,672
White pine							
Sawtimber	1,678	5,941	11,055	19,825	18,753	25,202	41,355
Poletimber	2,250	1,747	5,623	2,268	9,407	--	--
Sapling & seedling	3,146	--	--	--	--	--	--
All stands	7,074	7,688	16,678	22,093	28,160	25,202	41,355
Balsam fir							
Sawtimber	2,442	5,111	6,352	6,699	10,577	--	7,322
Poletimber	4,903	5,999	1,580	19,650	41,354	13,708	19,404
Sapling & seedling	3,278	--	2,138	1,740	1,167	--	--
All stands	10,623	11,110	10,070	28,089	53,098	13,708	26,726
White spruce							
Sawtimber	--	--	--	--	--	15,239	--
Poletimber	--	2,821	--	2,265	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	2,821	--	2,265	--	15,239	--
Black spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	1,400	5,069	26,432	7,736	12,069	2,452	--
Sapling & seedling	5,904	2,469	1,095	729	--	--	--
All stands	7,304	7,538	27,527	8,465	12,069	2,452	--
Northern white-cedar							
Sawtimber	--	6,216	--	10,415	7,874	22,454	32,281
Poletimber	4,570	955	2,407	9,938	17,746	55,166	64,968
Sapling & seedling	911	--	--	1,884	--	2,652	--
All stands	5,481	7,171	2,407	22,237	25,620	80,272	97,249

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)						
		0-10	11-20	21-30	31-40	41-50	51-60	61-70
Tamarack								
Sawtimber	480	--	--	--	--	--	480	--
Poletimber	23,337	--	251	452	--	2,148	2,106	1,784
Sapling & seedling	8,074	--	--	--	1,408	431	794	--
All stands	31,891	--	251	452	1,408	2,579	3,380	1,784
Oak-hickory								
Sawtimber	111,578	--	--	--	1,653	--	--	3,598
Poletimber	82,017	--	--	728	--	808	1,140	1,727
Sapling & seedling	9,856	--	--	1,068	544	1,364	5,755	--
All stands	203,451	--	--	1,796	2,197	2,172	6,895	5,325
Elm-ash-soft maple								
Sawtimber	103,138	--	--	798	1,116	1,287	1,538	4,101
Poletimber	118,323	--	--	--	1,109	2,951	3,781	9,460
Sapling & seedling	15,024	--	444	1,039	1,129	2,478	2,525	1,548
All stands	236,485	--	444	1,837	3,354	6,716	7,844	15,109
Maple-birch								
Sawtimber	922,628	--	--	--	--	5,643	7,035	15,128
Poletimber	847,445	--	--	--	1,648	3,363	15,487	28,301
Sapling & seedling	56,765	--	1,136	1,349	2,734	6,349	9,438	4,571
All stands	1,826,838	--	1,136	1,349	4,382	15,355	31,960	48,000
Aspen								
Sawtimber	174,746	--	--	1,582	1,780	2,236	9,254	6,707
Poletimber	594,312	--	406	2,482	834	19,234	24,616	47,792
Sapling & seedling	129,509	992	3,753	15,601	10,940	16,164	25,248	9,374
All stands	898,567	992	4,159	19,665	13,554	37,634	59,118	63,873
Paper birch								
Sawtimber	31,804	--	--	490	--	1,646	--	--
Poletimber	217,458	--	--	--	1,030	1,883	2,572	4,825
Sapling & seedling	17,110	206	--	565	--	3,984	1,709	247
All stands	266,372	206	--	1,055	1,030	7,513	4,281	5,072
Exotic								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Nonstocked	731	73	--	--	179	479	--	--
All types								
Sawtimber	1,787,481	--	369	3,121	7,632	13,822	26,786	43,279
Poletimber	2,382,304	--	657	4,903	4,621	33,879	53,329	101,959
Sapling & seedling	303,560	1,302	5,915	24,175	20,683	40,056	56,716	22,811
Nonstocked	731	73	--	--	179	479	--	--
All stands	4,474,076	1,375	6,941	32,199	33,115	88,236	136,831	168,049

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack							
Sawtimber	--	--	--	--	--	--	--
Poletimber	1,992	7,424	2,169	5,011	--	--	--
Sapling & seedling	4,407	--	1,034	--	--	--	--
All stands	6,399	7,424	3,203	5,011	--	--	--
Oak-hickory							
Sawtimber	10,899	722	4,266	22,595	46,916	16,635	4,294
Poletimber	7,873	2,733	9,186	20,531	29,312	7,979	--
Sapling & seedling	1,125	--	--	--	--	--	--
All stands	19,897	3,455	13,452	43,126	76,228	24,614	4,294
Elm-ash-soft maple							
Sawtimber	5,791	7,999	4,212	12,277	31,290	17,831	14,898
Poletimber	11,848	12,211	3,678	20,133	47,624	5,528	--
Sapling & seedling	2,231	--	3,461	169	--	--	--
All stands	19,870	20,210	11,351	32,579	78,914	23,359	14,898
Maple-birch							
Sawtimber	27,913	59,829	51,070	218,431	350,902	148,258	38,419
Poletimber	48,245	136,685	53,159	211,278	227,710	86,416	35,153
Sapling & seedling	9,476	3,576	3,133	8,550	2,873	3,580	--
All stands	85,634	200,090	107,362	438,259	581,485	238,254	73,572
Aspen							
Sawtimber	7,755	18,907	15,941	27,491	48,183	7,206	27,704
Poletimber	52,670	68,212	65,340	103,354	146,808	45,636	16,928
Sapling & seedling	22,196	10,643	11,240	2,553	--	805	--
All stands	82,621	97,762	92,521	133,398	194,991	53,647	44,632
Paper birch							
Sawtimber	--	1,295	2,365	12,361	4,418	9,229	--
Poletimber	7,891	16,370	6,070	53,360	74,761	46,820	1,876
Sapling & seedling	4,001	2,048	1,044	840	2,466	--	--
All stands	11,892	19,713	9,479	66,561	81,645	56,049	1,876
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--	--
All types							
Sawtimber	63,837	116,569	110,231	381,049	561,648	278,395	180,743
Poletimber	151,551	268,209	181,592	490,744	650,492	277,837	162,531
Sapling & seedling	58,837	19,657	23,400	16,465	6,506	7,037	--
Nonstocked	--	--	--	--	--	--	--
All stands	274,225	404,435	315,223	888,258	1,218,646	563,269	343,274

Table 37.--Net volume of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Northeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)						
		0-10	11-20	21-30	31-40	41-50	51-60	61-70
Jack pine								
Sawtimber	111,518	--	--	--	9,373	3,051	13,034	7,519
Poletimber	53,056	--	--	--	--	4,319	1,784	4,976
Sapling & seedling	6,214	--	--	--	1,695	3,421	--	1,098
All stands	170,788	--	--	--	11,068	10,791	14,818	13,593
Red pine								
Sawtimber	567,767	--	--	--	3,508	--	--	--
Poletimber	89,650	--	--	--	--	796	--	--
Sapling & seedling	23,850	--	702	--	2,856	7,614	9,425	--
All stands	681,267	--	702	--	6,364	8,410	9,425	--
White pine								
Sawtimber	596,027	--	--	1,198	--	6,433	14,103	9,210
Poletimber	50,103	--	--	--	--	--	--	--
Sapling & seedling	25,989	--	--	--	--	--	13,582	--
All stands	672,119	--	--	1,198	--	6,433	27,685	9,210
Balsam fir								
Sawtimber	139,316	--	--	--	--	3,010	12,075	7,899
Poletimber	172,524	--	--	--	--	2,572	--	1,315
Sapling & seedling	28,786	549	1,973	3,774	4,101	2,099	2,186	550
All stands	340,626	549	1,973	3,774	4,101	7,681	14,261	9,764
White spruce								
Sawtimber	41,622	--	--	--	--	--	--	7,211
Poletimber	8,715	--	--	--	--	--	--	--
Sapling & seedling	4,960	--	--	--	--	1,494	3,466	--
All stands	55,297	--	--	--	--	1,494	3,466	7,211
Black spruce								
Sawtimber	11,485	--	1,204	--	--	--	--	10,281
Poletimber	119,868	--	--	525	--	--	3,364	3,446
Sapling & seedling	23,013	--	--	1,160	--	4,994	805	--
All stands	154,366	--	1,204	1,685	--	4,994	4,169	13,727
Northern white-cedar								
Sawtimber	247,978	--	--	--	--	--	--	--
Poletimber	149,401	--	--	--	--	--	--	--
Sapling & seedling	10,889	--	--	--	417	5,210	--	--
All stands	408,268	--	--	--	417	5,210	--	--

(Table 37 continued on next page

[1/] International 1/4-inch rule.

(Table 37 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine							
Sawtimber	5,430	13,994	24,685	19,726	--	14,706	--
Poletimber	8,320	3,240	5,464	7,471	17,482	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	13,750	17,234	30,149	27,197	17,482	14,706	--
Red pine							
Sawtimber	21,882	21,728	28,433	211,592	180,425	41,203	58,996
Poletimber	1,140	13,883	1,845	24,116	27,392	15,536	4,942
Sapling & seedling	--	3,253	--	--	--	--	--
All stands	23,022	38,864	30,278	235,708	207,817	56,739	63,938
White pine							
Sawtimber	8,815	26,135	42,345	81,786	74,889	123,065	208,048
Poletimber	4,103	2,374	8,200	4,805	30,621	--	--
Sapling & seedling	12,407	--	--	--	--	--	--
All stands	25,325	28,509	50,545	86,591	105,510	123,065	208,048
Balsam fir							
Sawtimber	10,021	18,863	20,687	15,926	29,584	--	21,251
Poletimber	7,305	6,179	2,153	29,261	79,783	19,615	24,341
Sapling & seedling	7,060	--	1,238	4,054	1,202	--	--
All stands	24,386	25,042	24,078	49,241	110,569	19,615	45,592
White spruce							
Sawtimber	--	--	--	--	--	34,411	--
Poletimber	--	5,385	--	3,330	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	5,385	--	3,330	--	34,411	--
Black spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	2,535	4,125	79,041	8,062	18,770	--	--
Sapling & seedling	7,786	8,268	--	--	--	--	--
All stands	10,321	12,393	79,041	8,062	18,770	--	--
Northern white-cedar							
Sawtimber	--	16,106	--	29,866	23,197	82,613	96,196
Poletimber	6,714	1,213	4,530	13,920	8,932	64,926	49,166
Sapling & seedling	1,315	--	--	3,298	--	649	--
All stands	8,029	17,319	4,530	47,084	32,129	148,188	145,362

(Table 37 continued on next page)

(Table 37 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre) 0-10	11-20	21-30	31-40	41-50	51-60	61-70
Tamarack								
Sawtimber	1,283	--	--	--	--	--	1,283	--
Poletimber	23,918	--	1,397	878	--	--	1,280	4,472
Sapling & seedling	7,818	--	--	--	654	735	774	--
All stands	33,019	--	1,397	878	654	735	3,337	4,472
Oak-hickory								
Sawtimber	364,455	--	--	--	6,823	--	--	9,547
Poletimber	87,191	--	--	1,701	--	--	1,185	--
Sapling & seedling	28,345	--	--	2,690	2,191	4,430	15,680	--
All stands	479,991	--	--	4,391	9,014	4,430	16,865	9,547
Elm-ash-soft maple								
Sawtimber	324,164	--	--	4,472	3,923	4,845	3,099	13,373
Poletimber	167,437	--	--	--	3,031	4,216	5,196	18,972
Sapling & seedling	24,951	--	1,231	1,322	--	6,697	3,839	2,062
All stands	516,552	--	1,231	5,794	6,954	15,758	12,134	34,407
Maple-birch								
Sawtimber	3,385,483	--	--	--	--	16,835	22,444	61,256
Poletimber	1,165,448	--	--	--	2,842	2,304	12,240	36,806
Sapling & seedling	80,702	--	1,736	1,033	4,774	12,851	9,676	3,290
All stands	4,631,633	--	1,736	1,033	7,616	31,990	44,360	101,352
Aspen								
Sawtimber	516,182	--	--	5,671	5,478	9,282	31,524	17,983
Poletimber	665,847	--	980	3,901	929	34,537	25,617	46,338
Sapling & seedling	169,364	4,319	7,489	35,397	11,235	12,400	27,059	16,651
All stands	1,351,393	4,319	8,469	44,969	17,642	56,219	84,200	80,972
Paper birch								
Sawtimber	97,935	--	--	1,855	--	4,909	--	--
Poletimber	262,445	--	--	--	--	1,927	2,456	2,622
Sapling & seedling	12,981	1,176	--	3,456	--	2,180	2,523	998
All stands	373,361	1,176	--	5,311	--	9,016	4,979	3,620
Exotic								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--	--	--
All types								
Sawtimber	6,405,215	--	1,204	13,196	29,105	48,365	97,562	144,279
Poletimber	3,015,603	--	2,377	7,005	6,802	50,671	53,122	118,947
Sapling & seedling	447,862	6,044	13,131	48,832	27,923	64,125	89,015	24,649
Nonstocked	--	--	--	--	--	--	--	--
All stands	9,868,680	6,044	16,712	69,033	63,830	163,161	239,699	287,875

(Table 37 continued on next page)

(Table 37 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack							
Sawtimber	--	--	--	--	--	--	--
Poletimber	3,719	7,161	878	4,133	--	--	--
Sapling & seedling	4,340	--	1,315	--	--	--	--
All stands	8,059	7,161	2,193	4,133	--	--	--
Oak-hickory							
Sawtimber	37,236	1,773	14,014	76,225	158,091	52,440	8,306
Poletimber	21,104	1,842	8,187	28,872	16,257	8,043	--
Sapling & seedling	3,354	--	--	--	--	--	--
All stands	61,694	3,615	22,201	105,097	174,348	60,483	8,306
Elm-ash-soft maple							
Sawtimber	13,388	23,305	11,102	41,276	105,566	62,276	37,539
Poletimber	18,681	13,087	7,280	34,294	52,191	10,489	--
Sapling & seedling	1,683	--	7,553	564	--	--	--
All stands	33,752	36,392	25,935	76,134	157,757	72,765	37,539
Maple-birch							
Sawtimber	102,322	225,145	195,260	815,313	1,258,017	538,151	150,740
Poletimber	60,023	173,914	77,639	307,661	316,654	128,172	47,193
Sapling & seedling	12,836	4,708	10,248	10,770	1,877	6,903	--
All stands	175,181	403,767	283,147	1,133,744	1,576,548	673,226	197,933
Aspen							
Sawtimber	25,736	67,150	48,390	80,495	136,801	19,111	68,561
Poletimber	61,426	68,619	73,934	123,867	160,989	43,969	20,741
Sapling & seedling	30,728	8,439	10,785	4,862	--	--	--
All stands	117,890	144,208	133,109	209,224	297,790	63,080	89,302
Paper birch							
Sawtimber	--	3,075	5,502	38,782	11,029	32,783	--
Poletimber	11,571	17,571	5,724	57,687	95,118	65,056	2,713
Sapling & seedling	1,637	--	--	1,011	--	--	--
All stands	13,208	20,646	11,226	97,480	106,147	97,839	2,713
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--	--
All types							
Sawtimber	224,830	417,274	390,418	1,410,987	1,977,599	1,000,759	649,637
Poletimber	206,641	318,593	274,875	647,479	824,189	355,806	149,096
Sapling & seedling	83,146	24,668	31,139	24,559	3,079	7,552	--
Nonstocked	--	--	--	--	--	--	--
All stands	514,617	760,535	696,432	2,083,025	2,804,867	1,364,117	798,733

Table 38.--Net volume of sawtimber on commercial forest land by species group and butt log grade, Northeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All grades	Log grade 1	2	3	Tie and timber
Softwoods					
Jack pine	227,227	--	2,725	224,502	--
Red pine	902,043	65,125	80,479	756,439	--
White pine	1,032,510	228,710	247,066	502,947	53,787
White spruce	223,435	--	3,249	220,186	--
Black spruce	65,215	--	--	65,215	--
Balsam fir	422,051	--	2,757	419,294	--
Hemlock	772,542	110,403	113,702	548,437	--
Tamarack	41,560	--	--	41,560	--
Northern white-cedar	510,669	7,705	38,107	464,857	--
Other softwoods	--	--	--	--	--
Total	4,197,252	411,943	488,085	3,243,437	53,787
Hardwoods					
White oak	28,737	--	16,851	11,886	--
Select red oak	565,970	136,876	174,694	247,736	6,664
Other red oak	105,416	--	4,386	66,993	34,037
Select hickory	--	--	--	--	--
Other hickory	14,715	--	7,213	7,502	--
Basswood	562,327	166,415	129,016	260,970	5,926
Beech	59,359	4,687	26,749	21,895	6,028
Yellow birch	272,974	69,994	60,211	139,279	3,490
Hard maple	1,469,909	410,529	403,855	633,035	22,490
Soft maple	351,355	24,626	75,799	250,930	--
Elm	324,027	67,046	106,756	150,225	--
Black ash	99,241	15,883	26,905	56,453	--
White & green ash	179,441	23,928	29,377	122,440	3,696
Sycamore	--	--	--	--	--
Cottonwood	30,690	--	--	30,690	--
Willow	7,351	--	--	7,351	--
Hackberry	--	--	--	--	--
Balsam poplar	64,911	26,490	24,431	13,990	--
Bigtooth aspen	276,262	567	66,817	197,467	11,411
Quaking aspen	874,391	29,312	156,450	654,588	34,041
Paper birch	301,063	15,066	47,555	227,056	11,386
Black cherry	60,306	--	15,103	45,203	--
Black walnut	--	--	--	--	--
Butternut	22,406	--	12,090	10,316	--
Other hardwoods	577	--	--	577	--
Total	5,671,428	991,419	1,384,258	3,156,582	139,169
All species	9,868,680	1,403,362	1,872,343	6,400,019	192,956

[1/] International 1/4-inch rule.

Table 39.--Net volume of short-log trees on commercial forest land by species group and diameter class, Northeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods											
Jack pine	854	462	279	--	113	--	--	--	--	--	--
Red pine	172	--	--	--	--	172	--	--	--	--	--
White pine	1,216	--	740	148	--	328	--	--	--	--	--
White spruce	118	--	118	--	--	--	--	--	--	--	--
Black spruce	192	192	--	--	--	--	--	--	--	--	--
Balsam fir	482	32	152	--	298	--	--	--	--	--	--
Hemlock	2,617	260	372	446	684	509	157	--	189	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	3,282	794	1,882	250	246	110	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	8,933	1,740	3,543	844	1,341	1,119	157	--	189	--	--
Hardwoods											
White oak	435	--	237	95	103	--	--	--	--	--	--
Select red oak	3,823	--	134	2,024	628	334	127	151	256	169	--
Other red oak	1,636	--	486	260	260	146	--	--	484	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	--	--	--	--	--	--	--	--	--	--	--
Basswood	1,494	--	361	362	--	472	135	--	164	--	--
Beech	1,087	--	--	--	136	372	--	163	--	416	--
Yellow birch	4,250	--	706	560	692	825	490	484	392	101	--
Hard maple	9,734	--	3,235	1,933	1,486	1,507	671	239	472	191	--
Soft maple	4,446	--	961	1,270	802	473	468	--	472	--	--
Elm	3,785	--	494	1,171	1,034	771	184	--	--	131	--
Black ash	312	--	312	--	--	--	--	--	--	--	--
White & green ash	63	--	--	--	--	63	--	--	--	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	721	--	281	292	--	148	--	--	--	--	--
Quaking aspen	2,204	--	641	1,294	269	--	--	--	--	--	--
Paper birch	2,020	--	869	603	398	--	150	--	--	--	--
Black cherry	1,428	--	145	1,145	--	138	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--	--	--	--
Total	37,438	--	8,862	11,009	5,808	5,249	2,225	1,037	2,240	1,008	--
All species	46,371	1,740	12,405	11,853	7,149	6,368	2,382	1,037	2,429	1,008	--

Table 40.--Net volume of short-log trees on commercial forest land by species group and diameter class, Northeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 22.9	23.0- 28.9	29.0- 38.9	39.0+
Softwoods											
Jack pine	2,909	1,566	948	--	395	--	--	--	--	--	--
Red pine	692	--	--	--	--	692	--	--	--	--	--
White pine	3,990	--	2,333	477	--	1,180	--	--	--	--	--
White spruce	518	--	518	--	--	--	--	--	--	--	--
Black spruce	494	494	--	--	--	--	--	--	--	--	--
Balsam fir	1,367	74	402	--	891	--	--	--	--	--	--
Hemlock	6,434	514	825	1,090	1,729	1,334	421	--	521	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	11,322	2,613	6,517	891	893	408	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	27,726	5,261	11,543	2,458	3,908	3,614	421	--	521	--	--
Hardwoods											
White oak	1,185	--	661	258	266	--	--	--	--	--	--
Select red oak	8,446	--	294	4,414	1,387	732	286	342	596	395	--
Other red oak	3,690	--	1,069	573	586	334	--	--	1,128	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	--	--	--	--	--	--	--	--	--	--	--
Basswood	3,177	--	755	745	--	1,016	297	--	364	--	--
Beech	2,873	--	--	--	371	964	--	424	--	1,114	--
Yellow birch	10,171	--	1,406	1,251	1,633	2,023	1,244	1,256	1,073	285	--
Hard maple	23,048	--	7,288	4,520	3,541	3,690	1,668	605	1,227	509	--
Soft maple	12,174	--	2,832	3,588	2,144	1,239	1,194	--	1,177	--	--
Elm	9,356	--	1,137	2,852	2,573	1,959	471	--	--	364	--
Black ash	1,008	--	1,008	--	--	--	--	--	--	--	--
White & green ash	185	--	--	--	--	185	--	--	--	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	1,154	--	421	481	--	252	--	--	--	--	--
Quaking aspen	4,928	--	1,319	2,965	644	--	--	--	--	--	--
Paper birch	5,516	--	2,339	1,617	1,124	--	436	--	--	--	--
Black cherry	3,914	--	393	3,174	--	347	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--	--	--	--
Total	90,825	--	20,922	26,438	14,269	12,741	5,596	2,627	5,565	2,667	--
All species	118,551	5,261	32,465	28,896	18,177	16,355	6,017	2,627	6,086	2,667	--

[1/] International 1/4-inch rule.

Table 41.--Net annual growth of growing stock on commercial forest land by softwoods and hardwoods, Northeast Unit, Wisconsin, 1967 and 1982

(In thousand cubic feet)

Species	1967[1/]	1982
Softwoods	44,700	48,779
Hardwoods	85,700	89,427
All species	130,400	138,206

[1/] Figures have been adjusted from those published after the 1968 survey to conform to 1982 volumes because of changes in survey procedures.

Table 42.--Net annual growth of growing stock on commercial forest land by species group and county, Northeast Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All counties	County									
		Florence	Forest	Langlade	Lincoln	Menominee	Marinette	Oconto	Oneida	Shawano	Vilas
Softwoods											
Jack pine	4,081	17	--	45	277	209	1,221	369	590	253	1,100
Red pine	13,113	529	890	167	1,695	34	2,863	2,051	2,167	1,127	1,590
White pine	5,033	215	212	104	158	842	843	477	866	370	946
White spruce	3,553	340	1,220	224	100	9	923	108	451	59	119
Black spruce	2,656	74	475	226	155	256	193	--	860	67	350
Balsam fir	9,621	647	1,304	1,616	1,581	23	1,338	245	1,731	270	866
Hemlock	1,900	239	468	56	96	501	138	76	80	131	115
Tamarack	1,004	65	48	262	35	-2	259	71	2	146	118
Northern white-cedar	7,818	253	954	504	97	602	2,094	1,200	613	1,171	330
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	48,779	2,379	5,571	3,204	4,194	2,474	9,872	4,597	7,360	3,594	5,534
Hardwoods											--
White oak	133	--	--	2	2	42	52	-4	--	21	18
Select red oak	5,502	269	77	205	400	616	1,411	814	580	437	693
Other red oak	-251	-5	--	-12	--	41	-397	75	-14	64	-3
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	492	--	--	19	2	87	60	5	--	319	--
Basswood	8,458	648	2,298	1,943	518	495	802	686	221	654	193
Beech	197	--	18	-	--	-13	13	141	--	38	--
Yellow birch	807	143	272	184	50	9	19	19	31	117	-37
Hard maple	20,074	1,635	4,854	3,517	1,156	1,188	1,877	908	1,408	1,300	2,231
Soft maple	12,592	275	512	1,140	1,279	479	3,542	1,308	2,146	673	1,238
Elm	584	1	-626	382	180	-129	197	274	78	213	14
Black ash	2,493	-13	264	133	196	-16	585	376	230	566	172
White & green ash	2,385	29	347	193	306	152	281	609	17	431	20
Sycamore	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	398	--	--	2	--	--	16	354	--	26	--
Willow	35	--	--	--	--	--	10	7	--	18	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	450	27	229	20	--	-5	201	37	-22	-37	--
Bigtooth aspen	4,457	269	50	303	239	283	1,286	1,101	248	87	591
Quaking aspen	17,069	1,650	2,354	2,389	2,442	447	2,372	1,374	2,374	259	1,408
Paper birch	11,710	500	1,529	916	1,267	179	2,116	1,013	2,326	213	1,651
Black cherry	1,757	43	845	218	240	-14	217	44	32	113	19
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Butternut	83	--	20	--	--	-1	3	28	--	33	--
Other hardwoods	2	--	--	--	--	2	--	--	--	--	--
Total	89,427	5,471	13,043	11,554	8,277	3,842	14,663	9,169	9,655	5,545	8,208
All species	138,206	7,850	18,614	14,758	12,471	6,316	24,535	13,766	17,015	9,139	13,742

Table 43.--Net annual growth of sawtimber on commercial forest land by species group and county, Northeast Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All counties	County									
		Florence	Forest	Langlade	Lincoln	Menominee	Marinette	Oconto	Oneida	Shawano	Vilas
Softwoods											
Jack pine	14,570	71	--	183	520	401	5,993	630	1,784	1,569	3,419
Red pine	49,511	2,879	6,275	1,099	1,617	247	4,619	12,523	10,069	2,761	7,422
White pine	25,274	1,065	1,261	377	746	4,665	3,999	3,102	3,757	1,640	4,662
White spruce	12,294	1,572	4,471	750	571	61	1,985	576	1,371	348	589
Black spruce	3,105	191	453	473	143	248	80	--	1,100	7	410
Balsam fir	27,430	1,324	6,819	3,650	3,741	-10	3,366	916	5,144	468	2,012
Hemlock	9,082	1,195	2,409	426	471	2,272	633	358	428	297	593
Tamarack	1,785	84	65	130	135	50	154	682	192	151	142
Northern white-cedar	20,417	981	2,611	1,650	127	1,532	4,896	2,663	2,432	2,529	996
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	163,468	9,362	24,364	8,738	8,071	9,466	25,725	21,450	26,277	9,770	20,245
Hardwoods											
White oak	445	--	--	--	--	77	169	-18	--	170	47
Select red oak	21,591	1,417	290	810	1,077	4,244	2,993	685	4,288	2,965	2,822
Other red oak	4,530	560	--	--	--	452	2,221	168	508	602	19
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	528	--	--	--	9	165	6	25	--	323	--
Basswood	26,460	2,799	7,364	4,609	2,029	1,997	1,895	889	1,334	2,377	1,167
Beech	162	--	83	--	--	-32	-2	-57	--	170	--
Yellow birch	1,704	1,009	624	369	233	-736	55	146	58	189	-243
Hard maple	44,631	2,939	10,917	6,596	2,641	3,874	2,844	564	1,319	7,990	4,947
Soft maple	16,033	393	1,412	1,408	1,076	638	3,423	2,057	2,200	1,381	2,045
Elm	6,322	-143	729	1,511	670	-279	943	1,152	312	1,279	148
Black ash	3,832	5	318	287	1,374	-82	271	306	238	1,088	27
White & green ash	9,304	178	2,934	1,468	382	138	602	2,217	44	1,275	66
Sycamore	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	1,776	--	--	10	--	--	80	1,457	--	229	--
Willow	132	--	--	--	--	--	9	10	--	113	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	1,087	62	269	-1	--	-63	787	75	-70	28	--
Bigtooth aspen	13,273	491	32	2,035	434	586	2,449	4,882	613	274	1,477
Quaking aspen	53,832	5,666	8,959	5,426	8,629	688	7,069	4,140	5,403	1,415	6,437
Paper birch	20,415	1,056	3,463	723	1,444	248	3,334	1,617	3,286	1,579	3,665
Black cherry	2,282	94	762	600	59	147	117	126	--	355	22
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Butternut	715	--	170	--	--	-16	13	282	--	266	--
Other hardwoods	9	--	--	--	--	9	--	--	--	--	--
Total	229,063	16,526	38,326	25,851	20,057	12,055	29,278	20,723	19,533	24,068	22,646
All species	392,531	25,888	62,690	34,589	28,128	21,521	55,003	42,173	45,810	33,838	42,891

[1/] International 1/4-inch rule.

Table 44.--Net annual growth of growing stock on commercial forest land by ownership class and softwoods and hardwoods, Northeast Unit, Wisconsin, 1982

(In thousand cubic feet)

Ownership class	All species	Softwoods	Hardwoods
National Forest	20,150	6,174	13,976
Miscellaneous federal	58	32	26
State	7,316	3,724	3,592
County and municipal	23,268	9,674	13,594
Indian	7,867	2,952	4,915
Forest industry	18,133	5,761	12,372
Farmer	12,152	3,609	8,543
Misc. private-corp.	6,206	1,839	4,367
Misc. private-indiv.	43,056	15,014	28,042
All owners	138,206	48,779	89,427

Table 45.--Net annual growth of growing stock on commercial forest land by species group and type, Northeast Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All types	Forest type: Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	4,081	2,741	477	170	1	--	-11	30
Red pine	13,113	287	10,281	667	29	--	66	3
White pine	5,033	61	323	2,105	129	16	79	31
White spruce	3,553	--	74	-6	662	941	--	58
Black spruce	2,656	11	19	-8	474	--	1,428	312
Balsam fir	9,621	--	131	51	2,713	25	808	-109
Hemlock	1,900	--	7	51	36	3	3	65
Tamarack	1,004	--	--	-6	-10	--	130	123
Northern white-cedar	7,818	--	2	26	787	--	78	4,877
Other softwoods	--	--	--	--	--	--	--	--
Total	48,779	3,100	11,314	3,050	4,821	985	2,581	5,390
Hardwoods								
White oak	133	--	--	12	--	--	--	--
Select red oak	5,502	3	36	35	4	--	8	4
Other red oak	-251	-110	-156	5	-14	--	--	2
Select hickory	--	--	--	--	--	--	--	--
Other hickory	492	--	--	--	--	--	--	5
Basswood	8,458	--	--	-4	--	19	--	--
Beech	197	--	--	--	--	--	--	--
Yellow birch	807	--	--	--	6	--	3	134
Hard maple	20,074	--	34	8	24	6	1	--
Soft maple	12,592	6	30	217	171	--	17	7
Elm	584	--	95	-27	11	-3	--	-33
Black ash	2,493	--	--	5	191	--	--	-7
White & green ash	2,385	--	37	--	--	--	--	4
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	398	--	--	321	--	--	--	--
Willow	35	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	450	--	--	--	40	11	7	-14
Bigtooth aspen	4,457	66	42	10	29	--	-25	41
Quaking aspen	17,069	29	502	254	426	436	438	21
Paper birch	11,710	42	47	113	340	--	59	234
Black cherry	1,757	--	6	--	11	3	149	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	83	--	--	--	--	--	--	--
Other hardwoods	2	--	--	--	--	--	--	--
Total	89,427	36	673	949	1,239	472	657	398
All species	138,206	3,136	11,987	3,999	6,060	1,457	3,238	5,788

(Table 45 continued on next page)

(Table 45 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods								
Jack pine	--	98	--	36	534	-14	--	19
Red pine	3	326	--	171	1,052	220	--	8
White pine	70	108	226	1,122	568	194	--	1
White spruce	1	--	91	315	1,195	222	--	--
Black spruce	119	--	25	60	178	24	--	14
Balsam fir	44	5	981	1,593	2,814	560	--	5
Hemlock	-7	3	162	1,524	46	7	--	--
Tamarack	603	6	10	113	16	19	--	--
Northern white-cedar	28	--	949	618	319	134	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	861	546	2,444	5,552	6,722	1,366	--	47
Hardwoods								
White oak	--	54	18	20	29	--	--	--
Select red oak	-3	2,304	35	1,513	1,070	493	--	--
Other red oak	--	144	23	-24	-100	-29	--	8
Select hickory	--	--	--	--	--	--	--	--
Other hickory	--	247	--	230	10	--	--	--
Basswood	--	90	160	7,755	362	76	--	--
Beech	--	8	11	178	--	--	--	--
Yellow birch	--	--	52	536	25	51	--	--
Hard maple	--	223	77	17,586	1,876	239	--	--
Soft maple	23	477	1,293	5,036	4,074	1,241	--	--
Elm	--	20	221	193	82	25	--	--
Black ash	--	--	1,879	225	204	-4	--	--
White & green ash	--	29	516	1,650	119	30	--	--
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	26	16	35	--	--	--
Willow	--	--	25	8	--	2	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	-9	--	52	-7	308	62	--	--
Bigtooth aspen	-7	163	24	486	3,447	181	--	--
Quaking aspen	7	186	326	2,410	11,291	759	--	-16
Paper birch	78	275	243	2,056	4,306	3,917	--	--
Black cherry	--	-16	9	684	863	48	--	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	--	-11	--	54	40	--	--	--
Other hardwoods	--	--	--	2	--	--	--	--
Total	89	4,193	4,990	40,607	28,041	7,091	--	-8
All species	950	4,739	7,434	46,159	34,763	8,457	--	39

Table 46.--Net annual growth of sawtimber on commercial forest land by species group and type, Northeast Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	14,570	9,829	498	712	12	--	-72	--
Red pine	49,511	544	37,811	2,208	165	--	386	14
White pine	25,274	164	1,710	10,821	650	94	198	74
White spruce	12,294	--	451	133	1,722	4,187	--	63
Black spruce	3,105	487	--	-109	447	--	748	882
Balsam fir	27,430	--	131	69	6,125	108	3,644	1,207
Hemlock	9,082	--	35	341	209	15	26	202
Tamarack	1,785	--	--	--	215	--	34	91
Northern white-cedar	20,417	--	10	89	2,312	--	142	9,196
Other softwoods	--	--	--	--	--	--	--	--
Total	163,468	11,024	40,646	14,264	11,857	4,404	5,106	11,729
Hardwoods								
White oak	445	--	--	11	--	--	--	--
Select red oak	21,591	14	72	130	13	--	62	19
Other red oak	4,530	94	94	17	--	--	--	12
Select hickory	--	--	--	--	--	--	--	--
Other hickory	528	--	--	--	--	--	--	25
Basswood	26,460	--	--	-26	--	--	--	--
Beech	162	--	--	--	--	--	--	--
Yellow birch	1,704	--	3	--	29	--	16	146
Hard maple	44,631	--	8	--	61	33	6	--
Soft maple	16,033	--	--	281	82	--	97	-364
Elm	6,322	--	--	-62	73	-11	--	-14
Black ash	3,832	--	--	--	306	--	--	-90
White & green ash	9,304	--	639	--	--	--	--	17
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	1,776	--	--	1,275	--	--	--	--
Willow	132	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	1,087	--	--	--	8	50	--	-61
Bigtooth aspen	13,273	401	147	76	18	--	-87	65
Quaking aspen	53,832	374	1,419	1,164	1,074	286	1,228	-34
Paper birch	20,415	97	163	670	241	--	181	223
Black cherry	2,282	--	--	--	78	94	--	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	715	--	--	--	--	--	--	--
Other hardwoods	9	--	--	--	--	--	--	--
Total	229,063	980	2,545	3,536	1,983	452	1,503	-56
All species	392,531	12,004	43,191	17,800	13,840	4,856	6,609	11,673

(Table 46 continued on next page)

[1/] International 1/4-inch rule.

(Table 46 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods								
Jack pine	--	294	--	164	3,057	-37	--	113
Red pine	16	1,161	--	1,420	4,233	1,508	--	45
White pine	240	567	818	6,293	2,821	819	--	5
White spruce	5	--	283	1,321	3,556	573	--	--
Black spruce	283	--	22	86	171	--	--	88
Balsam fir	13	43	1,999	4,866	7,822	1,403	--	--
Hemlock	-28	18	641	7,364	220	39	--	--
Tamarack	410	38	95	181	696	25	--	--
Northern white-cedar	590	--	3,759	3,282	719	318	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	1,529	2,121	7,617	24,977	23,295	4,648	--	251
Hardwoods								
White oak	--	133	170	55	76	--	--	--
Select red oak	15	7,460	70	6,551	4,829	2,356	--	--
Other red oak	--	2,417	79	720	1,097	--	--	--
Select hickory	--	--	--	--	--	--	--	--
Other hickory	--	--	--	503	--	--	--	--
Basswood	--	301	887	24,555	529	214	--	--
Beech	--	--	15	147	--	--	--	--
Yellow birch	--	--	129	1,416	-51	16	--	--
Hard maple	--	293	324	42,699	1,037	170	--	--
Soft maple	96	472	2,293	8,349	3,288	1,439	--	--
Elm	--	--	1,147	4,751	427	11	--	--
Black ash	--	--	3,120	479	17	--	--	--
White & green ash	--	138	2,597	5,357	450	106	--	--
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	229	80	192	--	--	--
Willow	--	--	122	--	--	10	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	--	--	212	46	832	--	--	--
Bigtooth aspen	-52	686	61	1,769	9,469	720	--	--
Quaking aspen	63	395	1,174	11,666	33,175	1,848	--	--
Paper birch	33	320	1,221	7,934	4,242	5,090	--	--
Black cherry	--	31	16	1,266	797	--	--	--
Black walnut	--	--	--	--	--	--	--	--
Butternut	--	--	--	379	336	--	--	--
Other hardwoods	--	--	--	9	--	--	--	--
Total	155	12,646	13,866	118,731	60,742	11,980	--	--
All species	1,684	14,767	21,483	143,708	84,037	16,628	--	251

Table 47.--Net annual growth of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Northeast Unit, Wisconsin, 1982

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	869	--	--	--	46	33	91	78	25	182	151	154	--	109	--
Poletimber	1,846	--	--	--	--	379	-48	204	214	178	122	254	543	--	--
Sapling & seedling	421	--	--	7	38	45	--	234	97	--	--	--	--	--	--
All stands	3,136	--	--	7	84	457	43	516	336	360	273	408	543	109	--
Red pine															
Sawtimber	4,740	--	--	--	27	--	--	--	489	320	251	1,506	1,504	431	212
Poletimber	6,706	--	--	--	--	16	--	--	246	300	214	2,498	1,425	906	1,101
Sapling & seedling	541	--	8	--	162	65	106	--	--	60	140	--	--	--	--
All stands	11,987	--	8	--	189	81	106	--	735	680	605	4,004	2,929	1,337	1,313
White pine															
Sawtimber	2,702	--	--	9	--	38	111	76	66	90	77	706	542	434	553
Poletimber	1,067	--	--	--	--	--	--	--	97	86	267	120	497	--	--
Sapling & seedling	230	--	--	--	--	--	121	--	109	--	--	--	--	--	--
All stands	3,999	--	--	9	--	38	232	76	272	176	344	826	1,039	434	553
Balsam fir															
Sawtimber	1,078	--	--	--	--	47	80	85	35	143	165	203	194	--	126
Poletimber	3,422	--	--	--	--	38	--	49	300	204	33	402	1,322	496	578
Sapling & seedling	1,560	37	64	37	67	78	320	201	239	--	267	203	47	--	--
All stands	6,060	37	64	37	67	163	400	335	574	347	465	808	1,563	496	704
White spruce															
Sawtimber	1,117	--	--	--	--	--	--	195	--	--	--	--	--	922	--
Poletimber	299	--	--	--	--	--	--	--	--	156	--	143	--	--	--
Sapling & seedling	41	--	--	12	--	9	20	--	--	--	--	--	--	--	--
All stands	1,457	--	--	12	--	9	20	195	--	156	--	143	--	922	--
Black spruce															
Sawtimber	109	--	69	--	--	--	--	40	--	--	--	--	--	--	--
Poletimber	2,245	--	--	26	--	--	48	242	54	140	997	232	390	116	--
Sapling & seedling	884	--	3	148	119	141	35	75	137	148	43	35	--	--	--
All stands	3,238	--	72	174	119	141	83	357	191	288	1,040	267	390	116	--
Northern white-cedar															
Sawtimber	1,282	--	--	--	--	--	--	--	--	91	--	274	257	294	366
Poletimber	4,047	--	--	--	--	--	--	--	184	29	94	408	619	1,435	1,278
Sapling & seedling	459	--	--	26	11	134	--	--	29	--	--	72	--	187	--
All stands	5,788	--	--	26	11	134	--	--	213	120	94	754	876	1,916	1,644

(Table 47 continued on next page)

(Table 47 continued)

(Table 47 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	8	--	--	--	--	--	8	--	--	--	--	--	--	--	--
Poletimber	794	--	11	3	--	65	21	47	18	187	25	417	--	--	--
Sapling & seedling	148	--	--	--	93	-2	-18	--	48	--	27	--	--	--	--
All stands	950	--	11	3	93	63	11	47	66	187	52	417	--	--	--
Oak-hickory															
Sawtimber	2,020	--	--	--	-13	--	--	129	363	13	94	408	679	268	79
Poletimber	2,447	--	--	-13	--	39	-8	86	231	15	293	803	842	159	--
Sapling & seedling	272	--	9	83	9	50	94	--	27	--	--	--	--	--	--
All stands	4,739	--	9	70	-4	89	86	215	621	28	387	1,211	1,521	427	79
Elm-ash-soft maple															
Sawtimber	1,756	--	--	23	44	19	52	83	202	158	109	253	342	329	142
Poletimber	4,673	--	--	--	33	170	152	281	272	490	174	1,370	1,662	69	--
Sapling & seedling	1,005	--	23	44	63	150	200	63	185	--	285	-8	--	--	--
All stands	7,434	--	23	67	140	339	404	427	659	648	568	1,615	2,004	398	142
Maple-birch															
Sawtimber	15,562	--	--	--	--	177	394	346	268	773	1,063	4,055	6,072	2,234	180
Poletimber	27,577	--	--	--	36	155	837	1,633	1,718	4,667	2,188	7,179	6,495	1,909	760
Sapling & seedling	3,020	--	306	185	240	308	672	144	558	86	93	262	47	119	--
All stands	46,159	--	306	185	276	640	1,903	2,123	2,544	5,526	3,344	11,496	12,614	4,262	940
Aspen															
Sawtimber	4,338	--	--	46	43	52	111	222	431	417	530	595	1,111	216	564
Poletimber	20,968	--	15	57	45	540	1,079	2,000	2,085	2,479	2,515	3,734	4,692	1,352	375
Sapling & seedling	9,457	665	198	1,260	1,079	1,337	1,761	554	991	745	723	94	--	50	--
All stands	34,763	665	213	1,363	1,167	1,929	2,951	2,776	3,507	3,641	3,768	4,423	5,803	1,618	939
Paper birch															
Sawtimber	757	--	--	14	--	36	--	--	--	39	87	331	117	133	--
Poletimber	6,857	--	--	--	87	97	291	178	229	636	136	1,768	2,394	1,031	10
Sapling & seedling	843	5	--	58	--	307	34	14	144	66	61	43	111	--	--
All stands	8,457	5	--	72	87	440	325	192	373	741	284	2,142	2,622	1,164	10
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	39	34	--	--	-16	21	--	--	--	--	--	--	--	--	--
All types															
Sawtimber	36,338	-	69	92	147	402	847	1,254	1,879	2,226	2,527	8,485	10,818	5,370	2,222
Poletimber	82,948	-	26	73	201	1,499	2,372	4,720	5,648	9,567	7,058	19,328	20,881	7,473	4,102
Sapling & seedling	18,881	707	611	1,860	1,881	2,622	3,345	1,285	2,564	1,105	1,639	701	205	356	--
Nonstocked	39	34	--	--	-16	21	--	--	--	--	--	--	--	--	--
All stands	138,206	741	706	2,025	2,213	4,544	6,564	7,259	10,091	12,898	11,224	28,514	31,904	13,199	6,324

Table 48.--Net annual growth of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Northeast Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	4,536	--	--	--	470	87	757	102	127	441	1,279	833	--	440	--
Poletimber	5,686	--	--	--	--	649	64	854	751	125	1,855	434	954	--	--
Sapling & seedling	1,782	--	--	--	546	690	--	546	--	--	--	--	--	--	--
All stands	12,004	--	--	--	1,016	1,426	821	1,502	878	566	3,134	1,267	954	440	--
Red pine															
Sawtimber	30,734	--	--	--	170	--	--	--	3,386	1,502	1,225	10,656	11,063	1,478	1,254
Poletimber	10,881	--	--	--	--	53	--	--	18	925	82	3,677	4,578	1,168	380
Sapling & seedling	1,576	--	38	--	589	342	429	--	--	178	--	--	--	--	--
All stands	43,191	--	38	--	759	395	429	--	3,404	2,605	1,307	14,333	15,641	2,646	1,634
White pine															
Sawtimber	14,302	--	--	80	--	223	609	413	445	508	776	3,525	1,748	2,707	3,268
Poletimber	2,504	--	--	--	--	--	--	--	198	86	272	135	1,813	--	--
Sapling & seedling	994	--	--	--	--	--	645	--	349	--	--	--	--	--	--
All stands	17,800	--	--	80	--	223	1,254	413	992	594	1,048	3,660	3,561	2,707	3,268
Balsam fir															
Sawtimber	4,884	--	--	--	--	143	440	367	286	864	732	808	954	--	290
Poletimber	7,521	--	--	--	--	55	--	61	342	273	44	1,142	4,048	764	792
Sapling & seedling	1,435	226	80	458	177	101	64	44	124	--	47	106	8	--	--
All stands	13,840	226	80	458	177	299	504	472	752	1,137	823	2,056	5,010	764	1,082
White spruce															
Sawtimber	4,183	--	--	--	--	--	--	718	--	--	--	--	--	3,465	--
Poletimber	440	--	--	--	--	--	--	--	--	346	--	94	--	--	--
Sapling & seedling	233	--	--	--	--	46	187	--	--	--	--	--	--	--	--
All stands	4,856	--	--	--	--	46	187	718	--	346	--	94	--	3,465	--
Black spruce															
Sawtimber	175	--	34	--	--	--	--	141	--	--	--	--	--	--	--
Poletimber	5,880	--	--	38	--	--	109	-58	181	180	4,366	392	672	--	--
Sapling & seedling	554	--	--	16	--	145	62	--	18	313	--	--	--	--	--
All stands	6,609	--	34	54	--	145	171	83	199	493	4,366	392	672	--	--
Northern white-cedar															
Sawtimber	5,851	--	--	--	--	--	--	--	--	56	--	1,086	770	2,450	1,489
Poletimber	5,510	--	--	--	--	--	--	--	271	94	101	986	225	2,894	939
Sapling & seedling	312	--	--	--	12	110	--	--	94	--	--	50	--	46	--
All stands	11,673	--	--	--	12	110	--	--	365	150	101	2,122	995	5,390	2,428

[1/] International 1/4-inch rule.

(Table 48 continued on next page)

(Table 48 continued)

(Table 48 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	58	--	--	--	--	--	58	--	--	--	--	--	--	--	--
Poletimber	1,576	--	100	22	--	--	92	154	266	290	15	637	--	--	--
Sapling & seedling	50	--	--	--	6	49	-51	--	1	--	45	--	--	--	--
All stands	1,684	--	100	22	6	49	99	154	267	290	60	637	--	--	--
Oak-hickory															
Sawtimber	9,024	--	--	--	216	--	--	521	936	46	344	2,120	3,657	743	441
Poletimber	4,194	--	--	37	--	--	13	--	1,669	11	434	1,406	373	251	--
Sapling & seedling	1,549	--	--	385	551	214	287	--	112	--	--	--	--	--	--
All stands	14,767	--	--	422	767	214	300	521	2,717	57	778	3,526	4,030	994	441
Elm-ash-soft maple															
Sawtimber	11,405	--	--	96	97	248	82	1,442	1,066	695	1,610	1,454	1,992	1,915	708
Poletimber	7,400	--	--	--	189	236	166	1,124	1,220	383	289	1,339	2,340	114	--
Sapling & seedling	2,678	--	23	27	--	65	1,116	138	498	--	802	9	--	--	--
All stands	21,483	--	23	123	286	549	1,364	2,704	2,784	1,078	2,701	2,802	4,332	2,029	708
Maple-birch															
Sawtimber	82,421	--	--	--	--	2,158	943	2,950	1,844	6,411	6,454	21,963	29,930	9,127	641
Poletimber	52,781	--	--	--	73	54	1,520	4,039	2,699	8,846	5,975	13,510	11,242	3,773	1,050
Sapling & seedling	8,506	--	41	1,087	186	980	2,188	141	758	920	1,462	459	34	250	--
All stands	143,708	--	41	1,087	259	3,192	4,651	7,130	5,301	16,177	13,891	35,932	41,206	13,150	1,691
Aspen															
Sawtimber	22,295	--	--	150	392	550	1,371	883	979	3,483	2,879	3,291	5,033	282	3,002
Poletimber	45,066	--	70	253	66	2,197	1,415	4,388	7,353	5,475	6,030	5,364	9,164	2,060	1,231
Sapling & seedling	16,676	1,643	530	4,091	2,664	2,109	1,079	888	2,614	230	543	285	--	--	--
All stands	84,037	1,643	600	4,494	3,122	4,856	3,865	6,159	10,946	9,188	9,452	8,940	14,197	2,342	4,233
Paper birch															
Sawtimber	3,813	--	--	97	--	251	--	--	--	220	352	1,672	337	884	--
Poletimber	11,414	--	--	--	102	134	59	129	431	807	174	2,149	4,880	2,460	89
Sapling & seedling	1,401	544	--	451	--	236	44	71	34	--	--	21	--	--	--
All stands	16,628	544	--	548	102	621	103	200	465	1,027	526	3,842	5,217	3,344	89
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	251	251	--	--	--	--	--	--	--	--	--	--	--	--	--
All types															
Sawtimber	193,681	--	34	423	1,345	3,660	4,260	7,537	9,069	14,226	15,651	47,408	55,484	23,491	11,093
Poletimber	160,853	--	170	350	430	3,378	3,438	10,691	15,399	17,841	19,637	31,265	40,289	13,484	4,481
Sapling & seedling	37,746	2,413	712	6,515	4,731	5,087	6,050	1,828	4,602	1,641	2,899	930	42	296	--
Nonstocked	251	251	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	392,531	2,664	916	7,288	6,506	12,125	13,748	20,056	29,070	33,708	38,187	79,603	95,815	37,271	15,574

Table 49.--Timber removals from growing stock on commercial forest land by species group and county, Northeast Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All counties	County									
		Florence	Forest	Langlade	Lincoln	Menominee	Marinette	Oconto	Oneida	Shawano	Vilas
Softwoods											
Jack pine	3,216	30	--	24	108	190	1,192	617	516	80	459
Red pine	5,143	219	498	330	398	23	851	891	949	448	536
White pine	3,073	105	177	40	199	750	340	192	570	164	536
White spruce	1,235	203	564	34	27	--	224	44	96	--	43
Black spruce	875	39	212	47	41	--	91	--	307	1	137
Balsam fir	6,388	420	1,789	496	264	--	957	145	1,736	13	568
Hemlock	3,871	187	350	89	48	1,781	276	151	74	135	780
Tamarack	125	13	10	10	21	--	26	--	40	3	2
Northern white-cedar	834	2	145	15	1	3	175	32	51	404	6
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	24,760	1,218	3,745	1,085	1,107	2,747	4,132	2,072	4,339	1,248	3,067
Hardwoods											
White oak	230	--	--	14	1	15	128	13	--	32	27
Select red oak	3,416	107	148	198	389	183	647	159	635	588	362
Other red oak	557	17	--	--	--	21	328	27	26	132	6
Hickory	164	--	--	18	6	14	--	--	--	126	--
Basswood	2,668	264	697	322	357	290	187	104	123	288	36
Beech	225	--	--	--	--	43	28	41	--	113	--
Yellow birch	1,449	169	310	149	116	143	74	87	154	115	132
Hard maple	10,085	741	2,331	1,607	915	623	766	340	843	1,053	866
Soft maple	3,879	99	359	352	504	322	737	600	452	277	177
Elm	5,894	375	1,515	733	403	996	277	422	213	773	187
Ash	1,586	34	191	251	265	159	154	70	140	271	51
Cottonwood	13	--	--	--	--	--	1	7	--	5	--
Balsam poplar	90	13	32	--	--	--	28	17	--	--	--
Bigtooth aspen	8,296	253	115	537	328	574	2,582	1,337	1,044	258	1,268
Quaking aspen	32,353	2,529	5,527	3,128	3,776	1,086	6,062	1,725	4,922	894	2,704
Paper birch	6,710	320	953	439	622	55	766	481	1,747	109	1,218
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods[1/]	321	6	44	48	14	17	62	4	55	55	16
Total	77,936	4,927	12,222	7,796	7,696	4,541	12,827	5,434	10,354	5,089	7,050
All species	102,696	6,145	15,967	8,881	8,803	7,288	16,959	7,506	14,693	6,337	10,117

[1/] Includes black cherry and butternut

Table 50.--Timber removals from sawtimber on commercial forest land by species group and county, Northeast Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All counties	County									
		Florence	Forest	Langlade	Lincoln	Menominee	Marinette	Oconto	Oneida	Shawano	Vilas
Softwoods											
Jack pine	4,581	37	--	48	146	232	1,388	819	964	99	848
Red pine	13,098	463	1,123	743	1,152	60	1,884	1,906	2,900	1,026	1,841
White pine	14,046	444	903	213	721	4,051	1,734	417	2,373	831	2,359
White spruce	2,497	249	769	84	87	--	495	111	457	6	239
Black spruce	730	27	159	51	27	2	83	--	233	1	147
Balsam fir	10,778	627	2,888	815	431	--	1,579	304	3,165	32	937
Hemlock	10,764	667	1,319	417	109	5,697	1,216	313	212	612	202
Tamarack	174	20	17	16	37	--	14	--	62	5	3
Northern white-cedar	2,043	11	323	60	3	13	380	130	197	903	23
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	58,711	2,545	7,501	2,447	2,713	10,055	8,773	4,000	10,563	3,515	6,599
Hardwoods											
White oak	793	--	--	--	--	42	485	60	--	129	77
Select red oak	12,002	368	513	774	1,434	789	1,654	509	2,272	2,481	1,208
Other red oak	2,049	64	--	--	--	89	1,252	163	56	399	26
Hickory	477	--	--	--	27	39	--	--	--	411	--
Basswood	8,337	431	1,328	1,122	887	1,390	878	474	372	1,365	90
Beech	932	--	--	--	--	210	125	56	--	541	--
Yellow birch	5,004	644	1,173	410	303	630	308	374	422	260	480
Hard maple	37,084	2,516	7,968	5,479	3,129	2,917	3,018	1,577	2,859	4,602	3,019
Soft maple	9,750	236	868	969	1,267	670	1,843	1,195	1,138	1,058	506
Elm	21,501	956	5,172	2,356	1,374	4,246	890	1,847	892	2,979	789
Ash	4,028	101	312	675	665	143	375	278	321	1,034	124
Cottonwood	57	--	--	--	--	--	5	29	--	23	--
Balsam poplar	218	--	1	--	--	--	135	80	--	2	--
Bigtooth aspen	24,430	929	121	2,485	898	1,403	5,675	5,050	3,180	1,069	3,620
Quaking aspen	81,457	5,131	15,579	7,015	9,319	2,363	15,625	4,670	12,490	2,144	7,121
Paper birch	9,109	275	1,019	604	1,011	39	1,286	1,102	2,047	298	1,428
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods[2/]	654	24	112	117	34	55	30	15	--	215	52
Total	217,882	11,675	34,166	22,006	20,348	15,025	33,584	17,479	26,049	19,010	18,540
All species	276,593	14,220	41,667	24,453	23,061	25,080	42,357	21,479	36,612	22,525	25,139

[1/] International 1/4-inch rule.

[2/] Includes black cherry and butternut.

Table 51.--Growing-stock average annual removals on commercial forest land by species group and county, Northeast Unit, Wisconsin, 1968-1982

(In thousand cubic feet per year)

Species group	All counties	County									
		Florence	Forest	Langlade	Lincoln	Menominee	Marinette	Oconto	Oneida	Shawano	Vilas
Softwoods											
Jack pine	2,166	--	--	--	--	--	935	--	1,097	--	134
Red pine	3,245	--	582	92	383	--	160	--	1,832	--	196
White pine	2,688	82	468	--	--	965	123	126	641	103	180
White spruce	1,151	234	640	75	--	3	92	--	107	--	--
Black spruce	466	48	53	--	--	--	86	--	279	--	--
Balsam fir	4,949	100	1,309	435	208	--	1,115	70	1,565	26	121
Hemlock	2,865	203	220	67	99	532	--	96	737	--	911
Tamarack	70	48	--	--	--	--	22	--	--	--	--
Northern white-cedar	1,432	145	--	165	--	--	491	27	108	496	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	19,032	860	3,272	834	690	1,500	3,024	319	6,366	625	1,542
Hardwoods											
White oak	79	--	--	--	--	41	--	--	--	38	--
Select red oak	1,928	57	67	39	--	323	512	36	249	365	280
Other red oak	448	--	--	--	--	--	220	--	--	228	--
Hickory	--	--	--	--	--	--	--	--	--	--	--
Basswood	2,570	348	951	290	533	148	114	37	149	--	--
Beech	45	--	--	--	--	45	--	--	--	--	--
Yellow birch	1,422	588	309	302	--	170	--	--	--	53	--
Hard maple	5,133	870	2,011	602	803	108	87	113	150	203	186
Soft maple	2,133	--	59	50	491	159	783	400	97	--	94
Elm	5,681	998	1,157	1,147	395	1,057	151	162	51	563	--
Ash	1,174	--	79	131	237	143	104	258	36	186	--
Cottonwood	56	--	--	--	--	--	--	56	--	--	--
Balsam poplar	197	90	41	--	--	--	66	--	--	--	--
Bigtooth aspen	6,644	--	--	398	--	706	3,191	823	258	--	1,268
Quaking aspen	18,417	2,316	2,135	2,206	1,636	189	4,210	1,490	2,715	--	1,520
Paper birch	6,173	197	444	511	412	218	1,448	431	1,417	75	1,020
Black cherry	322	--	97	94	--	--	--	37	41	53	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Butternut	68	--	--	--	--	--	68	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--	--	--	--
Total	52,490	5,464	7,350	5,770	4,507	3,307	10,954	3,843	5,163	1,764	4,368
All species	71,522	6,324	10,622	6,604	5,197	4,807	13,978	4,162	11,529	2,389	5,910

Table 52.--Sawtimber average annual removals on commercial forest land by species group and county, Northeast Unit, Wisconsin, 1968-1982

(In thousand board feet per year)[1/]

Species group	All counties	County									
		Florence	Forest	Langlade	Lincoln	Menominee	Marinette	Oconto	Oneida	Shawano	Vilas
Softwoods											
Jack pine	6,726	--	--	--	--	--	2,606	--	3,794	--	326
Red pine	9,299	--	2,452	--	601	--	--	--	5,194	--	1,052
White pine	13,020	500	2,472	--	--	5,373	685	--	2,700	538	752
White spruce	3,018	368	1,633	353	--	--	393	--	271	--	--
Black spruce	470	--	--	--	--	--	--	--	470	--	--
Balsam fir	10,013	272	2,275	810	298	--	2,273	211	3,550	--	324
Hemlock	8,223	792	856	287	474	2,487	--	--	3,327	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	3,384	93	--	83	--	--	972	--	355	1,881	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	54,153	2,025	9,688	1,533	1,373	7,860	6,929	211	19,661	2,419	2,454
Hardwoods											--
White oak	380	--	--	--	--	197	--	--	--	183	--
Select red oak	6,580	276	329	190	--	1,407	650	--	1,207	1,767	754
Other red oak	1,065	--	--	--	--	--	--	--	--	1,065	--
Hickory	--	--	--	--	--	--	--	--	--	--	--
Basswood	6,828	634	2,266	501	1,982	728	--	177	540	--	--
Beech	224	--	--	--	--	224	--	--	--	--	--
Yellow birch	6,757	3,153	1,537	1,173	--	894	--	--	--	--	--
Hard maple	17,402	3,483	6,399	1,576	3,765	551	--	--	--	1,020	608
Soft maple	3,247	--	324	232	1,931	201	387	--	--	--	172
Elm	19,324	3,288	3,320	4,110	1,604	3,466	180	584	224	2,548	--
Ash	2,137	--	--	220	1,094	--	--	--	174	649	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	656	365	--	--	--	--	291	--	--	--	--
Bigtooth aspen	8,949	--	--	1,269	--	1,124	2,084	2,318	305	--	1,849
Quaking aspen	29,331	4,556	3,338	5,275	1,241	--	3,184	3,555	4,004	--	4,178
Paper birch	6,127	--	1,055	873	344	255	1,540	252	1,587	--	221
Black cherry	1,005	--	233	302	--	--	--	213	--	257	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--	--	--	--
Total	110,012	15,755	18,801	15,721	11,961	9,047	8,316	7,099	8,041	7,489	7,782
All species	164,165	17,780	28,489	17,254	13,334	16,907	15,245	7,310	27,702	9,908	10,236

[1/] International 1/4-inch rule.

Table 53.--Timber removals from growing stock and sawtimber on commercial forest land by species group, Northeast Unit, Wisconsin, 1967 and 1982

Species group	Growing stock		Sawtimber	
	1967	1982	1967	1982
	Thousand cubic feet		Thousand board feet[1/]	
Softwoods				
Jack pine	3,179	3,216	6,741	4,581
Red pine	696	5,143	3,026	13,098
White pine	2,241	3,073	12,637	14,046
White spruce	392	1,235	2,443	2,497
Black spruce	441	875	604	730
Balsam fir	2,193	6,388	7,900	10,778
Hemlock	2,737	3,871	13,902	10,764
Tamarack	130	125	466	174
Northern white-cedar	637	834	1,349	2,043
Other softwoods	--	--	--	--
Total	12,646	24,760	49,068	58,711
Hardwoods				
White oak	64	230	349	793
Select red oak	1,422	3,416	6,880	12,002
Other red oak	526	557	1,965	2,049
Hickory	236	164	526	477
Basswood	1,227	2,668	6,604	8,337
Beech	189	225	942	932
Yellow birch	1,573	1,449	6,776	5,004
Hard maple	6,303	10,085	31,118	37,084
Soft maple	1,494	3,879	5,351	9,750
Elm	2,937	5,894	12,885	21,501
Ash	1,291	1,586	4,259	4,028
Cottonwood	14	13	74	57
Balsam poplar	--	90	--	218
Bigtooth aspen	9,944	8,296	32,861	24,430
Quaking aspen	31,417	32,353	60,706	81,457
Paper birch	1,994	6,710	6,105	9,109
Black walnut	3	--	25	--
Other hardwoods[2/]	344	321	1,375	654
Total	60,978	77,936	178,801	217,882
All species	73,624	102,696	227,869	276,593

[1/] International 1/4-inch rule.

[2/] Includes black cherry and butternut.

Table 54.--Timber removals from growing stock and sawtimber on commercial forest land by item and species category, Northeast Unit, Wisconsin, 1982

Item	Growing stock						Sawtimber					
	All species	Pine	Other softwoods	Aspen	Oak	Other hardwoods	All species	Pine	Other softwoods	Aspen	Oak	Other hardwoods
	Thousand cubic feet						Thousand board feet[1]					
Roundwood products												
Pulpwood[2]	59,399	7,313	8,913	29,690	1,054	12,429	118,992	11,941	14,720	69,224	2,464	20,643
Saw logs	24,408	3,402	2,010	6,336	1,596	11,064	127,477	18,881	10,338	31,967	8,493	57,798
Fuelwood	4,532	34	29	466	717	3,286	12,707	77	53	1,517	1,940	9,120
Posts	346	7	339	--	--	--	358	8	350	--	--	--
Veneer logs	987	2	--	145	192	648	6,377	16	--	942	1,241	4,178
Poles	24	11	13	--	--	--	92	41	51	--	--	--
Other	13	1	--	--	--	12	65	4	--	--	--	61
Total	89,709	10,770	11,304	36,637	3,559	27,439	266,068	30,968	25,512	103,650	14,138	91,800
Logging residue	5,411	297	351	2,179	315	2,269	8,670	609	637	1,754	706	4,964
Other removals	7,576	365	1,673	1,833	329	3,376	1,855	148	837	483	--	387
All removals	102,696	11,432	13,328	40,649	4,203	33,084	276,593	31,725	26,986	105,887	14,844	97,151

[1] International 1/4-inch rule.

[2] Includes particleboard and waferboard bolts.

Table 55.--Annual mortality of growing stock on commercial forest land by softwoods and hardwoods, Northeast Unit, Wisconsin, 1967 and 1982

(In thousand cubic feet)

Species	1967[1/]	1982
Softwoods	6,600	8,094
Hardwoods	24,800	29,278
Total	31,400	37,372

[1/] Figures have been adjusted from those published after the 1968 survey to conform to 1982 volumes because of changes in survey procedures.

Table 56.--Annual mortality of growing stock on commercial forest land by species group and cause, Northeast Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
Softwoods								
Jack pine	694	13	14	--	3	34	20	610
Red pine	118	--	--	--	13	--	--	105
White pine	589	2	32	--	30	20	7	498
White spruce	290	19	4	--	2	85	39	141
Black spruce	609	10	79	--	12	150	2	356
Balsam fir	3,888	372	212	--	22	578	2	2,702
Hemlock	800	--	38	--	40	119	--	603
Tamarack	724	--	39	--	114	72	--	499
Northern white-cedar	382	--	11	--	4	82	1	284
Other softwoods	--	--	--	--	--	--	--	--
Total	8,094	416	429	--	240	1,140	71	5,798
Hardwoods								
White oak	39	--	--	--	--	2	--	37
Select red oak	817	--	53	--	18	35	--	711
Other red oak	2,195	--	126	--	--	22	9	2,038
Select hickory	--	--	--	--	--	--	--	--
Other hickory	129	--	--	--	--	--	--	129
Basswood	950	10	72	--	--	62	40	766
Beech	293	--	5	--	--	--	--	288
Yellow birch	1,235	--	156	--	--	128	--	951
Hard maple	1,839	3	234	--	7	171	8	1,416
Soft maple	1,565	--	271	--	1	137	3	1,153
Elm	4,577	227	2,889	--	--	32	--	1,429
Black ash	612	--	36	--	--	43	--	533
White & green ash	176	--	10	--	--	11	10	145
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	12	--	--	--	--	--	--	12
Willow	11	--	--	--	--	--	--	11
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	506	--	21	--	--	19	--	466
Bigtooth aspen	1,897	15	393	--	26	42	--	1,421
Quaking aspen	10,981	4	2,196	--	40	952	17	7,772
Paper birch	1,124	--	357	--	41	52	24	650
Black cherry	282	--	18	--	--	--	38	226
Black walnut	--	--	--	--	--	--	--	--
Butternut	38	--	--	--	--	12	--	26
Other hardwoods	--	--	--	--	--	--	--	--
Total	29,278	259	6,837	--	133	1,720	149	20,180
All species	37,372	675	7,266	--	373	2,860	220	25,978

Table 57.--Annual mortality of sawtimber on commercial forest land by species group and cause, Northeast Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
Softwoods								
Jack pine	1,344	66	62	--	10	67	--	1,139
Red pine	491	--	--	--	--	--	--	491
White pine	2,958	8	182	--	172	115	--	2,481
White spruce	902	--	18	--	4	294	--	586
Black spruce	495	55	14	--	--	267	--	159
Balsam fir	6,380	548	587	--	11	1,419	--	3,815
Hemlock	3,150	--	150	--	140	518	--	2,342
Tamarack	188	--	--	--	--	102	--	86
Northern white-cedar	1,110	--	94	--	55	294	--	667
Other softwoods	--	--	--	--	--	--	--	--
Total	17,018	677	1,107	--	392	3,076	--	11,766
Hardwoods								
White oak	91	--	3	--	--	--	--	88
Select red oak	1,677	--	175	--	88	104	--	1,310
Other red oak	1,252	--	60	--	--	93	--	1,099
Select hickory	--	--	--	--	--	--	--	--
Other hickory	4	--	--	--	--	--	--	4
Basswood	1,280	--	226	--	--	174	--	880
Beech	1,068	--	--	--	--	--	--	1,068
Yellow birch	4,440	--	493	--	--	574	--	3,373
Hard maple	3,752	--	559	--	23	475	--	2,695
Soft maple	1,927	--	560	--	--	23	--	1,344
Elm	11,079	490	6,579	--	--	122	--	3,888
Black ash	736	--	7	--	--	61	--	668
White & green ash	271	--	10	--	--	62	--	199
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	2	--	--	--	--	--	--	2
Willow	48	--	--	--	--	--	--	48
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	1,019	--	26	--	--	85	--	908
Bigtooth aspen	3,317	76	934	--	36	55	--	2,216
Quaking aspen	11,708	--	2,433	--	100	1,329	--	7,846
Paper birch	642	--	124	--	3	62	--	453
Black cherry	100	--	--	--	--	--	--	100
Black walnut	--	--	--	--	--	--	--	--
Butternut	69	--	--	--	--	--	--	69
Other hardwoods	--	--	--	--	--	--	--	--
Total	44,482	566	12,189	--	250	3,219	--	28,258
All species	61,500	1,243	13,296	--	642	6,295	--	40,024

[1/] International 1/4-inch rule.

Table 58.--Annual mortality of growing stock and sawtimber on commercial forest land by county and softwoods and hardwoods, Northeast Unit, Wisconsin, 1982

County	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwood
	- - - - Thousand cubic feet - - - -			- - - Thousand board feet[1/] - - -		
Florence	2,223	317	1,906	4,056	951	3,10
Forest	6,188	2,099	4,089	11,326	3,997	7,32
Langlade	3,870	658	3,212	5,267	1,025	4,24
Lincoln	3,026	507	2,519	3,927	1,225	2,70
Menominee	3,101	567	2,534	9,105	2,426	6,67
Marinette	6,767	830	5,937	8,011	1,723	6,28
Oconto	2,254	388	1,866	3,877	761	3,11
Oneida	4,339	1,620	2,719	6,397	2,842	3,55
Shawano	2,465	399	2,066	3,781	386	3,39
Vilas	3,139	709	2,430	5,753	1,682	4,07
All counties	37,372	8,094	29,278	61,500	17,018	44,48

[1/] International 1/4-inch rule.

Table 59.--Annual mortality of growing stock and sawtimber on commercial forest land by ownership class and softwoods and hardwoods, Northeast Unit, Wisconsin, 1982

Ownership class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	- - - - Thousand cubic feet - - - -			- - - Thousand board feet[1/] - - -		
National Forest	5,997	2,200	3,797	11,543	4,578	6,965
Miscellaneous federal	68	1	67	62	3	59
State	1,577	400	1,177	2,263	659	1,604
County and municipal	6,087	1,013	5,074	6,917	1,622	5,295
Indian	3,480	591	2,889	9,747	2,487	7,260
Forest industry	4,353	1,240	3,113	7,880	2,506	5,374
Farmer	3,666	540	3,126	6,010	924	5,086
Misc. private-corp.	1,382	152	1,230	2,027	374	1,653
Misc. private-indiv.	10,762	1,957	8,805	15,051	3,865	11,186
All owners	37,372	8,094	29,278	61,500	17,018	44,482

[1/] International 1/4-inch rule.

Table 60.--Output of timber products by product, softwoods and hardwoods, and source of material, Northeast Unit, Wisconsin, 1981

Product	Standard units	Total		Roundwood products				Plant byproducts	
				Growing stock		Non-growing stock			
		No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet
Pulpwood[1]									
Softwoods	Standard[2]	254,342	20,062	205,735	16,226	31,039	2,448	17,568	1,388
Hardwoods	cords	751,019	59,341	546,384	43,173	96,702	7,641	107,933	8,527
Total		1,005,361	79,403	752,119	59,399	127,741	10,089	125,501	9,915
Saw logs									
Softwoods	Thousand[3]	31,323	5,503	30,805	5,412	518	91	--	--
Hardwoods	board feet	118,229	20,649	108,764	18,996	9,465	1,653	--	--
Total		149,552	26,152	139,569	24,408	9,983	1,744	--	--
Veneer logs									
Softwoods	Thousand[3]	17	2	17	2	--	--	--	--
Hardwoods	board feet	6,791	10,98	6,092	985	699	113	--	--
Total		6,808	1,100	6,109	987	699	113	--	--
Fuelwood									
Softwoods	Standard[2]	41,565	2,904	903	63	19,788	1,380	20,874	1,461
Hardwoods	cords	366,585	25,631	63,935	4,469	235,226	16,442	67,424	4,720
Total		408,150	28,535	64,838	4,532	255,014	17,822	88,298	6,181
Posts									
Softwoods	Thousand	371	380	338	346	33	34	--	--
Hardwoods	pieces	--	--	--	--	--	--	--	--
Total		371	380	338	346	33	34	--	--
Poles									
Softwoods	Pieces	2,700	24	2,700	24	--	--	--	--
Hardwoods		--	--	--	--	--	--	--	--
Total		2,700	24	2,700	24	--	--	--	--
Other[4]									
Softwoods	Thousand	183	183	1	1	--	--	182	182
Hardwoods	cubic feet	1,249	1,249	12	12	8	8	1,229	1,229
Total		1,432	1,432	13	13	8	8	1,411	1,411
All products									
Softwoods	Thousand	--	29,058	--	22,074	--	3,953	--	3,031
Hardwoods	cubic feet	--	107,968	--	67,635	--	25,857	--	14,476
Total		--	137,026	--	89,709	--	29,810	--	17,507

[1] Includes roundwood and plant byproducts used for particleboard and waferboard.

[2] 128 cubic feet; includes wood, bark, and air space.

[3] International 1/4-inch rule.

[4] Other (industrial production) includes cabin logs, charcoal wood, shingle bolts, pilings, etc.

Table 61.--Output of roundwood products by product, softwoods and hardwoods, and source of material, Northeast Unit, Wisconsin, 1981

(In thousand cubic feet)

Product and species group	All sources	Growing-stock trees			Rough and rotten trees	Salvable dead trees	Other sources
		Total	Sawtimber	Poletimber			
Industrial products							
Saw logs							
Softwoods	5,503	5,412	5,087	325	2	25	64
Hardwoods	20,649	18,996	17,081	1,915	375	1,133	145
Subtotal	26,152	24,408	22,168	2,240	377	1,158	209
Veneer logs and bolts							
Softwoods	2	2	2	--	--	--	--
Hardwoods	1,098	985	985	--	113	--	--
Subtotal	1,100	987	987	--	113	--	--
Pulpwood[1/]							
Softwoods	18,674	16,226	7,832	8,394	262	802	1,384
Hardwoods	50,814	43,173	24,433	18,740	3,351	1,816	2,474
Subtotal	69,488	59,399	32,265	27,134	3,613	2,618	3,858
Piling							
Softwoods	1	1	1	--	--	--	--
Hardwoods	--	--	--	--	--	--	--
Subtotal	1	1	1	--	--	--	--
Poles							
Softwoods	24	24	20	4	--	--	--
Hardwoods	--	--	--	--	--	--	--
Subtotal	24	24	20	4	--	--	--
Posts (Round and split)							
Softwoods	380	346	92	254	4	--	30
Hardwoods	--	--	--	--	--	--	--
Subtotal	380	346	92	254	4	--	30
Other							
Softwoods	--	--	--	--	--	--	--
Hardwoods	20	12	12	--	6	--	2
Subtotal	20	12	12	--	6	--	2
All industrial products							
Softwoods	24,584	22,011	13,034	8,977	268	827	1,478
Hardwoods	72,581	63,166	42,511	20,655	3,845	2,949	2,621
Total	97,165	85,177	55,545	29,632	4,113	3,776	4,099
Fuelwood							
Softwoods	1,443	63	42	21	9	864	507
Hardwoods	20,911	4,469	2,770	1,699	859	10,217	5,366
Total	22,354	4,532	2,812	1,720	868	11,081	5,873
All products							
Softwoods	26,027	22,074	13,076	8,998	277	1,691	1,985
Hardwoods	93,492	67,635	45,281	22,354	4,704	13,166	7,987
Total	119,519	89,709	58,357	31,352	4,981	14,857	9,972

[1/] Includes particleboard and waferboard bolts.

Table 62.--Timber products from roundwood by species group and product, Northeast Unit, Wisconsin, 1981

cies group	All products	Pulpwood[1]		Saw logs		Veneer logs	
	Thousand cubic feet	Standard cords[2]	Thousand cubic feet	Thousand board feet[3]	Thousand cubic feet	Thousand board feet[3]	Thousand cubic feet
twoods							
ack pine	4,316	48,460	3,824	1,151	240	--	--
ed pine	5,917	55,844	4,412	5,537	940	--	--
hite pine	2,927	6,450	504	13,418	2,280	17	2
hite spruce	989	11,243	886	431	90	--	--
lack spruce	900	10,224	806	392	82	--	--
alsam fir	6,541	78,939	6,220	1,309	274	--	--
emlock	3,633	24,191	1,911	7,721	1,312	--	--
amarack	118	1,423	111	9	2	--	--
orthern white-cedar	686	--	--	1,355	283	--	--
ther softwoods	--	--	--	--	--	--	--
Total	26,027	236,774	18,674	31,323	5,503	17	2
dwoods							
hite oak	464	2,221	175	755	132	29	4
elect red oak	5,668	13,176	1,040	7,769	1,361	1,129	183
ther red oak	916	2,129	168	1,256	220	183	30
ickory	353	463	36	510	89	--	--
asswood	2,784	8,860	699	8,598	1,533	321	50
eech	440	27	2	1,688	302	4	4/
ellow birch	2,133	9,832	776	3,345	594	811	132
ard maple	12,485	58,464	4,622	22,554	3,767	1,556	255
oft maple	4,860	30,402	2,405	5,417	962	211	34
lm	10,736	22,041	1,742	20,240	3,613	1,153	187
sh	2,181	13,735	10,87	2,847	507	84	13
ottonwood	43	--	--	239	43	--	--
alsam poplar	46	--	--	262	46	--	--
igtooth aspen	8,044	81,979	6,476	7,254	1,266	196	32
uaking aspen	32,704	333,276	26,328	29,489	5,148	799	129
aper birch	9,233	63,901	5,057	5,596	998	268	42
lack walnut	4/	--	--	1	4/	--	--
ther hardwoods[5]	402	2,580	201	409	68	47	7
Total	93,492	643,086	50,814	118,229	20,649	6,791	1,098
species	119,519	879,860	69,488	149,552	26,152	6,808	1,100

(Table 62 continued on next page)

1/ Includes particleboard and waferboard bolts.

2/ 128 cubic feet; includes wood, bark, and air space.

3/ International 1/4-inch rule.

4/ Less than 500 cubic feet.

5/ Includes butternut and black cherry.

(Table 62 continued)

Species group	Fuelwood		Posts		Poles		Other products
	Standard cords [2]	Thousand cubic feet	Thousand pieces	Thousand cubic feet	Pieces	Thousand cubic feet	Thousand cubic feet
Softwoods							
Jack pine	3,593	252	--	--	--	--	--
Red pine	7,821	546	8	7	1,200	11	1
White pine	2,032	141	--	--	--	--	--
White spruce	190	13	--	--	--	--	--
Black spruce	173	12	--	--	--	--	--
Balsam fir	684	47	--	--	--	--	--
Hemlock	5,858	410	--	--	--	--	--
Tamarack	86	5	--	--	--	--	--
Northern white-cedar	254	17	363	373	1,500	13	--
Other softwoods	--	--	--	--	--	--	--
Total	20,691	1,443	371	380	2,700	24	1
Hardwoods							
White oak	2,186	153	--	--	--	--	--
Select red oak	44,090	3,084	--	--	--	--	--
Other red oak	7,126	498	--	--	--	--	--
Hickory	3,301	228	--	--	--	--	--
Basswood	7,169	502	--	--	--	--	--
Beech	1,947	136	--	--	--	--	--
Yellow birch	9,028	631	--	--	--	--	--
Hard maple	54,743	3,831	--	--	--	--	10
Soft maple	20,769	1,449	--	--	--	--	10
Elm	74,222	5,194	--	--	--	--	--
Ash	8,293	574	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--
Bigtooth aspen	3,862	270	--	--	--	--	--
Quaking aspen	15,703	1,099	--	--	--	--	--
Paper birch	44,839	3,136	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--
Other hardwoods [5]	1,883	126	--	--	--	--	--
Total	299,161	20,911	--	--	--	--	20
All species	319,852	22,354	371	380	2,700	24	21

[2] 128 cubic feet; includes wood, bark, and air space.

[5] Includes butternut and black cherry.

Table 63.--Volume of primary plant residue by use and type of residue, Northeast Unit, Wisconsin, 1981

(In thousand cubic feet)

Use	Wood residue							
	Total		Coarse [1]		Fine [2]		Bark [3]	
	Softwoods	Hardwoods	Softwoods	Hardwoods	Softwoods	Hardwoods	Softwoods	Hardwoods
Fiber products [4]	902.0	6,235.4	742.3	5,155.4	159.7	1,080.0	--	41.8
Charcoal	--	43.9	--	16.7	--	27.2	--	0.8
Industrial fuel	1,052.3	3,750.9	553.0	1,387.8	499.3	2,363.1	785.7	4,210.6
Domestic fuel	408.9	968.8	326.5	880.8	82.4	88.0	176.6	422.7
Miscellaneous [5]	182.4	1,184.7	3.5	38.6	178.9	1,146.1	36.6	278.4
Not used [6]	51.8	79.3	15.1	53.6	36.7	25.7	12.7	39.1
Total	2,597.4	12,263.0	1,640.4	7,532.9	957.0	4,730.1	1,011.6	4,993.4

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark disposal at pulpmills.

[4] For manufacture of pulp, hardboard, or roofing felt.

[5] Livestock bedding, mulch, small dimension, and specialty items.

[6] Includes residue burned as waste.

Table 64.- All live tree biomass on commercial forest land by species group and forest type, Northeast Unit, Wisconsin, 1983

Table 64.--All live tree biomass on commercial forest land by species group and forest type, Northeast Unit, Wisconsin, 1983

(In green tons)

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	5,694,089	3,613,863	689,303	309,165	27,747	--	23,542	19,222
Red pine	11,166,075	202,169	8,086,309	637,022	78,675	--	105,717	6,237
White pine	8,109,482	83,579	453,723	3,344,906	197,637	48,986	92,252	251,227
White spruce	2,854,080	--	122,845	67,313	485,398	784,591	--	127,211
Black spruce	4,782,157	19,526	60,486	98,421	471,360	--	3,027,642	514,978
Balsam fir	14,304,512	11,588	134,561	382,380	4,481,384	37,990	808,486	1,536,575
Hemlock	9,983,088	--	66,863	135,866	258,084	6,049	61,107	361,700
Tamarack	2,552,352	--	--	4,526	93,937	--	448,977	326,155
Eastern redcedar	1,823	--	--	--	--	--	--	--
Northern white-cedar	10,974,705	--	3,982	59,932	983,359	--	92,973	7,290,311
Other softwoods	45,592	--	45,592	--	--	--	--	--
Total	70,467,955	3,930,725	9,663,664	5,039,531	7,077,581	877,616	4,660,696	10,433,616
Hardwoods								
White oak	684,630	--	--	37,280	--	--	--	--
Select red oak	13,276,829	10,881	72,560	167,831	17,275	--	33,519	9,341
Other red oak	3,339,542	105,254	195,883	21,705	5,903	--	--	7,690
Select hickory	--	--	--	--	--	--	--	--
Other hickory	717,334	--	--	1,877	--	--	--	13,796
Basswood	12,784,579	--	--	22,473	--	12,623	--	--
Beech	1,001,154	--	--	--	--	--	--	--
Yellow birch	7,147,597	--	8,785	--	229,243	--	41,327	298,834
Hard maple	42,742,339	--	199,130	52,597	79,860	14,104	16,034	14,608
Soft maple	20,486,161	20,728	116,624	327,503	574,814	--	144,832	252,222
Elm	7,794,238	--	101,398	1,175	71,602	7,539	--	73,089
Black ash	5,885,156	--	--	13,718	277,428	--	6,333	879,066
White & green ash	3,687,108	--	40,043	--	--	--	--	13,837
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	381,354	--	--	222,932	--	--	--	--
Willow	150,779	--	--	--	--	--	--	7,151
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	1,081,983	--	--	--	51,678	36,350	7,781	39,756
Bigtooth aspen	7,812,199	63,668	72,867	40,507	70,277	--	41,489	42,096
Quaking aspen	32,312,379	227,299	903,931	689,152	892,954	158,813	599,059	263,533
Paper birch	20,153,936	50,522	157,686	358,040	621,875	6,850	164,913	738,838
Black cherry	3,633,173	1,383	27,889	17,191	212,586	37,204	74,851	6,619
Black walnut	--	--	--	--	--	--	--	--
Butternut	259,913	--	--	--	--	--	--	--
Other hardwoods	6,457	--	--	--	--	--	--	1,334
Noncommercial species	2,131,491	4,016	8,348	8,084	13,379	--	--	2,653
Total	187,470,331	483,751	1,905,144	1,982,065	3,118,874	273,483	1,130,138	2,664,463
All species	257,938,286	4,414,476	11,568,808	7,021,596	10,196,455	1,151,099	5,790,834	13,098,079

(Table 64 continued on next page)

(Table 64 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotics	Nonstocked
Softwoods								
Jack pine	15,112	162,403	--	64,688	740,787	6,565	--	21,692
Red pine	7,126	282,823	--	280,488	1,073,433	406,076	--	--
White pine	87,131	269,907	203,654	2,112,992	677,247	286,241	--	--
White spruce	5,453	--	97,360	317,041	644,796	202,072	--	--
Black spruce	151,669	--	62,497	98,582	237,844	39,152	--	--
Balsam fir	130,045	17,869	1,288,195	2,071,540	2,463,880	936,985	--	3,034
Hemlock	3,841	30,030	504,538	8,251,656	203,136	95,323	--	4,895
Tamarack	1,370,895	16,800	55,697	161,492	41,676	32,197	--	--
Eastern redcedar	--	--	1,823	--	--	--	--	--
Northern white-cedar	61,325	--	739,010	1,009,223	524,214	210,376	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	1,832,597	779,832	2,952,774	14,367,702	6,607,013	2,214,987	--	29,621
Hardwoods								
White oak	--	400,870	46,794	102,440	97,246	--	--	--
Select red oak	6,784	5,634,419	108,436	3,704,563	2,335,032	1,176,188	--	--
Other red oak	--	1,823,457	49,329	270,567	779,710	51,728	--	28,316
Select hickory	--	--	--	--	--	--	--	--
Other hickory	--	154,829	--	530,434	16,398	--	--	--
Basswood	--	182,996	193,059	11,659,520	605,832	108,076	--	--
Beech	--	22,565	26,970	908,118	43,501	--	--	--
Yellow birch	1,452	25,937	359,283	5,826,832	207,997	147,907	--	--
Hard maple	--	556,925	344,982	38,585,390	2,341,856	528,544	--	8,309
Soft maple	53,084	1,114,486	2,697,553	8,799,136	4,915,524	1,469,655	--	--
Elm	1,804	71,002	1,433,590	5,443,698	552,881	31,654	--	4,806
Black ash	2,156	--	3,347,422	900,619	393,259	65,155	--	--
White & green ash	--	57,715	1,029,946	2,267,707	232,319	42,129	--	3,412
Sycamore	--	--	--	--	--	--	--	--
Cottonwood	--	--	62,886	56,657	38,879	--	--	--
Willow	--	--	106,715	7,884	19,897	9,132	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	--	--	174,848	116,637	611,973	42,960	--	--
Bigtooth aspen	19,781	376,540	53,334	1,277,258	5,371,724	382,658	--	--
Quaking aspen	36,715	382,483	709,642	5,008,894	20,885,667	1,545,471	--	8,766
Paper birch	154,251	713,323	639,457	4,377,119	5,253,397	6,917,665	--	--
Black cherry	826	90,310	65,052	1,781,572	1,212,593	69,139	--	35,958
Black walnut	--	--	--	--	--	--	--	--
Butternut	--	--	6,944	176,213	76,756	--	--	--
Other hardwoods	--	--	--	5,123	--	--	--	--
Noncommercial species	--	29,479	93,743	1,602,933	313,596	55,260	--	--
Total	276,853	11,637,336	11,549,985	93,409,314	46,306,037	12,643,321	--	89,567
All species	2,109,450	12,417,168	14,502,759	107,777,016	52,913,050	14,858,308	--	119,188

Table 65.--All live tree biomass by species group and tree biomass component, Northeast Unit, Wisconsin, 1983

(In green tons)

Species group	All components	Biomass component				
		All live 1- to 5-inch trees	Growing stock		Cull	
			Boles	Tops and limbs	Boles	Tops and limbs
Softwoods						
Jack pine	5,694,089	617,980	3,129,787	1,335,448	440,661	170,213
Red pine	11,166,075	858,669	7,108,928	3,063,794	98,317	36,367
White pine	8,109,482	584,045	4,987,646	2,157,162	270,331	110,298
White spruce	2,854,080	437,904	1,609,674	669,391	96,851	40,260
Black spruce	4,782,157	2,448,695	1,576,901	658,809	83,522	14,230
Balsam fir	14,304,512	4,456,124	6,754,824	2,783,640	239,897	70,027
Hemlock	9,983,088	515,878	6,198,873	2,638,051	444,114	186,172
Tamarack	2,552,352	907,364	1,090,843	457,986	77,975	18,184
Eastern redcedar	1,823	--	--	--	1,303	520
Northern white-cedar	10,974,705	2,961,178	4,628,795	1,879,243	1,133,353	372,136
Other softwoods	45,592	--	--	--	31,967	13,625
Total	70,467,955	13,787,837	37,086,271	15,643,524	2,918,291	1,032,032
Hardwoods						
White oak	684,630	13,390	426,309	177,114	51,639	16,178
Select red oak	13,276,829	371,675	8,314,299	3,535,390	745,103	310,362
Other red oak	3,339,542	140,231	1,752,701	735,242	516,371	194,997
Select hickory	--	--	--	--	--	--
Other hickory	717,334	76,720	429,438	182,716	19,971	8,489
Basswood	12,784,579	740,642	7,998,049	3,389,928	471,197	184,763
Beech	1,001,154	78,836	481,457	204,885	176,211	59,765
Yellow birch	7,147,597	795,831	3,410,655	1,431,845	1,085,582	423,684
Hard maple	42,742,339	5,406,068	23,036,899	9,791,701	3,235,973	1,271,698
Soft maple	20,486,161	4,695,450	9,309,440	3,956,477	1,884,252	640,542
Elm	7,794,238	1,072,845	4,173,329	1,734,939	588,543	224,582
Black ash	5,885,156	1,533,298	2,656,295	1,111,150	465,085	119,328
White & green ash	3,687,108	301,286	2,273,237	968,297	106,069	38,219
Sycamore	--	--	--	--	--	--
Cottonwood	381,354	7,037	262,888	111,429	--	--
Willow	150,779	--	70,837	29,756	43,365	6,821
Hackberry	--	--	--	--	--	--
Balsam poplar	1,081,983	56,618	698,711	301,373	17,634	7,647
Bigtooth aspen	7,812,199	841,349	4,358,979	1,891,698	504,372	215,801
Quaking aspen	32,312,379	5,459,920	16,620,131	7,147,067	2,204,019	881,242
Paper birch	20,153,936	2,432,304	11,501,014	4,891,647	959,021	369,950
Black cherry	3,633,173	566,969	1,457,395	621,797	722,618	264,394
Black walnut	--	--	--	--	--	--
Butternut	259,913	--	172,062	73,520	10,037	4,294
Other hardwoods	6,457	1,334	3,610	1,513	--	--
Noncommercial species	2,131,491	--	--	--	1,885,391	246,100
Total	187,470,331	24,591,803	99,407,735	42,289,484	15,692,453	5,488,856
All species	257,938,286	38,379,640	136,494,006	57,933,008	18,610,744	6,520,888

Table 66.--Sampling errors[1/] for estimates smaller than the Unit totals of volume, net growth, removals, and area of commercial forest land, Northeast Unit, Wisconsin, 1983

Sampling error	Commercial forest land	Growing stock			Sawtimber		
		Inventory	Growth	Removals	Inventory	Growth	Removals
Percent	Thousand acres	- - - -Thousand cubic feet- - - -			- - - -Thousand board feet[2/] - - -		
1	735.5	14,193,455	775,335	18,787,284	91,644,866	4,446,574	71,353,852
2	183.9	3,548,364	193,834	4,696,821	22,911,216	1,111,643	17,838,463
3	81.7	1,577,051	86,148	2,087,476	10,182,763	494,064	7,928,206
4	46.0	887,091	48,458	1,174,205	5,727,804	277,911	4,459,616
5	29.4	567,738	31,013	751,491	3,665,795	177,863	2,854,154
10	7.4	141,935	7,753	187,873	916,449	44,466	713,539
15	3.3	63,082	3,446	83,499	407,311	19,763	317,128
20	1.8	35,484	1,938	46,968	229,112	11,116	178,385
25	1.2	22,710	1,241	30,060	146,632	7,115	114,166
50	0.3	5,677	310	7,515	36,658	1,779	28,542
100	0.1	1,419	78	1,879	9,164	445	7,135

[1/] At the 68-percent probability level.

[2/] International 1/4-inch rule.

Table 67.--Sampling errors for county totals of growing-stock volume, net growth, removals, and area of commercial forest land, Northeast Unit, Wisconsin, 1983

(Percent of estimate)

County	Commercial forest land	Growing stock		
		Inventory	Growth	Removals
Florence	1.74	7.06	9.74	54.10
Forest	1.22	4.68	6.27	40.25
Langlade	1.40	5.79	7.08	52.47
Lincoln	1.37	6.44	7.77	59.25
Menominee	1.86	5.82	10.83	61.52
Marinette	1.07	4.61	5.51	35.80
Oconto	1.46	5.95	7.29	66.38
Oneida	1.22	5.41	6.64	39.52
Shawano	1.70	6.57	9.01	87.52
Vilas	1.41	5.49	7.34	54.62
All counties	.44	1.78	2.32	15.84

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The timber resource of the Northeast Wisconsin Survey Unit declined 5.7 percent in commercial forest area and increased 23 percent in growing-stock volume between 1968 and 1983. Highlights and statistics from the fourth inventory of this unit are presented for area, volume, growth, mortality, removals, utilization, and biomass.

KEY WORDS: Statistics, area, volume, growth, mortality, and removals.

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Resource Bulletin **NC-79**

Pulpwood Production in the North-Central Region by County, 1982

James E. Blyth and W. Brad Smith

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HIGHLIGHTS

Lake States

Pulpwood production dropped slightly to 5.52 million cords in 1982. Harvesting of softwood roundwood rose above the record set in 1980. Red pine cutting reached a record high for the fifth straight year. Eight percent of total production was whole-tree chips; aspen was the preferred species. A decline in pulpwood production in the Lake States for pulpmills was nearly offset by the increased pulpwood output for flakeboard plants.

Total production rose 8 percent in Minnesota but fell 5 percent in Michigan and 4 percent in Wisconsin. Minnesota loggers cut a record volume of aspen. For the first time, Wisconsin loggers cut more than 200,000 cords of red pine.

Softwood residue imports from Canada fell to less than half the amount imported in 1980. Softwood residue imports from other areas of the U.S. continued to decline.

Central States

Central States pulpwood production fell 17 percent to 356,000 cords. Seventy percent was residue from wood-using mills. Indiana maintained production at the 1981 level, while output plunged sharply in Illinois, Iowa, and Missouri. Exports rose to 71 percent of total production, breaking all previous records (in volume and percent).

Pulpwood receipts were 106,000 cords, the lowest since 1957. Only 2,000 cords were imported. Most of the decline in receipts was due to mills closing in 1981—three in Illinois and one in Iowa.

Since 1979, nine mills have closed; most of the closures are expected to be permanent. Most of these idled mills supplied products chiefly to the housing industry.

Mills outside the Central States are likely to remain the major customers for Central States pulpwood.

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PULPWOOD PRODUCTION IN THE NORTH-CENTRAL REGION BY COUNTY, 1982

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This is the 24th annual report of the pulpwood harvest in Lake States counties and the 23rd annual report of the harvest in the Central States. Pulpwood constitutes more than half the industrial timber products harvested annually in the Lake States (Michigan, Minnesota, and Wisconsin) and is an important product in the Central States (Illinois, Indiana, Iowa, and Missouri).

Current detailed pulpwood production[1] information is necessary for intelligent planning and decisionmaking in procuring wood, managing forest resources, and developing forest industries. Also, researchers need current pulpwood information to plan projects.

Since 1979, we have included logs, bolts, and wood residue used in manufacturing particleboard, waferboard, and oriented strand board in this annual series. Together, these boards are called flakeboards. Wood used at flakeboard plants is identical or nearly identical to wood used at pulpmills.

Because flakeboard plants primarily use aspen and wood residue, including them does not distort roundwood use trends for other species nor preclude comparing survey results with 1978 and previous years.

Pulpmills and flakeboard plants using North Central States timber in 1982 reported their pulpwood receipts[2] by species groups and counties of origin. This report presents the results of the survey, analyzes the data where appropriate, compares results with 1981 or earlier years, and discusses trends in pulpwood production and use.

The Lake States and Central States are discussed separately because the timber types in each area are different and less information can be released about the Central States (more detailed data on pulpwood production and receipts in the Central States would reveal the operations of individual mills).

Pulpwood production in Minnesota is completely and accurately shown. However, to prevent disclosure of confidential information about softwood pulpwood use by individual companies, the total quantity of softwood pulpwood imports and exports between Minnesota and Canada are not reported. **Thus, some Minnesota softwood shipped to Canada is shown as remaining and used in Minnesota, and receipts of Canadian softwood in Minnesota are understated.**

LAKE STATES

Production

Pulpwood production fell 1 percent from 1981 to 5.52 million cords[3] in 1982 (table 1). Ninety-two out of 100 cords were roundwood (including chips from roundwood); the remainder was residue from wood-using plants.[4]

Principal species cut were aspen (2,382,000 cords), jack pine (536,000 cords), red pine (345,000 cords), and balsam fir (314,000 cords). Other notable species, each providing more than 180,000 cords were spruce, white birch, and hard maple.

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[1] *Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut in a specific county or region, plus the annual wood residue volume produced by sawmills, veneer mills, etc., in a specific State or region that was used to manufacture pulp, particleboard, waferboard, and oriented strand board.*

[2] *Pulpwood receipts are the volume of wood received by mills in a specific State or region, regardless of the geographic source.*

[3] *All references to cords are in standard cords. A standard cord contains 128 cubic feet including wood, bark, and air space.*

[4] *Residue is the byproduct from sawmills, veneer mills, cooperage mills, and other wood-using plants that is used for pulping and flakeboard. Residue includes slabs, edgings, veneer cores, sawdust, wood flour and chips manufactured from slabs, edgings, and veneer cores.*

Table 1.--Production and imports of pulpwood, Lake States, 1982

(In standard cords, unpeeled)

Species and destination	Production by States [1]				Imports			Total receipts
	Michigan	Minnesota	Wisconsin	Regional total	Other U.S. [2]	Canada	Total imports	
Roundwood								
Cedar								
Michigan	11,704	--	--	11,704	--	--	--	11,704
Total	11,704	--	--	11,704	--	--	--	11,704
Balsam fir								
Michigan	68,527	--	787	69,314	--	--	--	69,314
Minnesota	--	93,213	166	93,379	--	--	--	93,379
Wisconsin	27,193	1,540	102,148	130,881	--	--	--	130,881
Exported [3]	9,062	11,068	--	20,130	--	--	--	--
Total	104,782	105,821	103,101	313,704	--	--	--	293,574
Hemlock								
Michigan	51,701	--	662	52,363	--	--	--	52,363
Wisconsin	3,858	--	32,715	36,573	--	--	--	36,573
Total	55,559	--	33,377	88,936	--	--	--	88,936
Jack pine								
Michigan	111,506	--	615	112,121	--	--	--	112,121
Minnesota	--	113,592	3,733	117,325	-- [4]	--	-- [4]	117,325 [5]
Wisconsin	33,554	15,343	248,359	297,256	8,910 [4]	418	9,328 [4]	306,584 [5]
Exported [3]	82	9,057	--	9,139	--	--	--	--
Total	145,142	137,992	252,707	535,841	8,910 [4]	418	9,328 [4]	536,030 [5]
Red pine								
Michigan	83,383	--	2,243	85,626	--	--	--	85,626
Minnesota	--	20,111	2,375	22,486	--	--	--	22,486
Wisconsin	14,707	7,237	215,398	237,342	--	--	--	237,342
Total	98,090	27,348	220,016	345,454	--	--	--	345,454
White pine								
Michigan	17,881	--	224	18,105	--	--	--	18,105
Minnesota	--	13,484	681	14,165	--	--	--	14,165
Wisconsin	1,209	100	19,941	21,250	--	--	--	21,250
Total	19,090	13,584	20,846	53,520	--	--	--	53,520
Spruce								
Michigan	43,663	--	85	43,748	--	--	--	43,748
Minnesota	--	100,136	10	100,146	--	3,229	3,229	103,375
Wisconsin	18,891	26,006	28,216	73,113	--	5,471	5,471	78,584
Exported [3]	5,804	7,101	--	12,905	--	--	--	--
Total	68,358	133,243	28,311	229,912	--	8,700	8,700	225,707
Tamarack								
Michigan	6,941	--	--	6,941	--	--	--	6,941
Minnesota	--	17,434	--	17,434	--	--	--	17,434
Wisconsin	2,867	27,150	7,075	37,092	--	--	--	37,092
Total	9,808	44,584	7,075	61,467	--	--	--	61,467
Ash								
Michigan	9,706	--	--	9,706	--	--	--	9,706
Wisconsin	4,734	3,334	34,424	42,492	--	--	--	42,492
Total	14,440	3,334	34,424	52,198	--	--	--	52,198
Aspen								
Michigan	492,916	--	158	493,074	--	--	--	493,074
Minnesota	--	766,362	18,141	784,503	--	--	--	784,503
Wisconsin	139,381	86,938	865,921	1,092,240	--	--	--	1,092,240
Exported [3]	--	12,646	--	12,646	--	--	--	--
Total	632,297	865,946	884,220	2,382,463	--	--	--	2,369,817
Balsam poplar								
Michigan	32,022	--	--	32,022	--	--	--	32,022
Minnesota	--	54,961	1,214	56,175	--	--	--	56,175
Total	32,022	54,961	1,214	88,197	--	--	--	88,197
Basswood								
Michigan	16,395	--	22	16,417	--	--	--	16,417
Minnesota	--	147	--	147	--	--	--	147
Wisconsin	544	--	11,408	11,952	--	--	--	11,952
Total	16,939	147	11,430	28,516	--	--	--	28,516
Beech								
Michigan	13,657	--	--	13,657	--	--	--	13,657
Wisconsin	758	--	6	764	--	--	--	764
Total	14,415	--	6	14,421	--	--	--	14,421
White birch								
Michigan	55,956	--	117	56,073	--	--	--	56,073
Minnesota	--	177	--	177	--	--	--	177
Wisconsin	7,538	3,227	130,810	141,575	--	--	--	141,575
Total	63,494	3,404	130,927	197,825	--	--	--	197,825
Yellow birch								
Michigan	17,533	--	--	17,533	--	--	--	17,533
Wisconsin	8,022	--	23,071	31,093	--	--	--	31,093
Total	25,555	--	23,071	48,626	--	--	--	48,626
Cottonwood								
Michigan	391	--	--	391	--	--	--	391
Total	391	--	--	391	--	--	--	391
Elm								
Michigan	14,448	--	20	14,468	--	--	--	14,468
Wisconsin	41,810	91	53,308	95,209	--	--	--	95,209
Total	56,258	91	53,328	109,677	--	--	--	109,677

(Table 1 continued on next page)

(Table 1 continued)

Species and destination	Production by States 1/ Michigan	Minnesota	Wisconsin	Regional total	Imports Other U.S. 2/	Canada	Total imports	Total receipts
Roundwood (cont.)								
Hickory								
Michigan	352	--	--	352	--	--	--	352
Wisconsin	--	--	483	483	--	--	--	483
Total	352	--	483	835	--	--	--	835
Hard maple								
Michigan	44,526	--	18	44,544	--	--	--	44,544
Wisconsin	27,587	621	111,631	139,839	--	--	--	139,839
Total	72,113	621	111,649	184,383	--	--	--	184,383
Soft maple								
Michigan	86,533	--	80	86,613	--	--	--	86,613
Wisconsin	11,341	27	62,366	73,734	--	--	--	73,734
Total	97,874	27	62,446	160,347	--	--	--	160,347
Red oak								
Michigan	63,533	--	11	63,544	--	--	--	63,544
Wisconsin	2,009	87	48,689	50,785	--	--	--	50,785
Total	65,542	87	48,700	114,329	--	--	--	114,329
White oak								
Michigan	20,387	--	--	20,387	--	--	--	20,387
Wisconsin	252	49	12,477	12,778	--	--	--	12,778
Total	20,639	49	12,477	33,165	--	--	--	33,165
Other hardwoods								
Michigan	2,879	--	8	2,887	--	--	--	2,887
Wisconsin	2,493	--	3,281	5,774	--	--	--	5,774
Total	5,372	--	3,289	8,661	--	--	--	8,661
Total roundwood								
Michigan	1,266,540	--	5,050	1,271,590	--	--	--	1,271,590
Minnesota	--	1,179,617	26,320	1,205,937	--	3,229	3,229	1,209,166
Wisconsin	348,748	171,750	2,011,727	2,532,225	8,910	5,889	14,799	2,547,024
Exported 3/	14,948	39,872	--	54,820	--	--	--	--
Total	1,630,236	1,391,239	2,043,097	5,064,572	8,910	9,118	18,028	5,027,780
Residue, softwood								
Michigan	7,832	--	234	8,066	--	2,580	2,580	10,646
Minnesota	--	44,534	--	44,534	--	755	755	45,289
Wisconsin	5,602	4,261	41,646	51,509	121,987	35,703	157,690	209,199
Exported 3/	--	690	--	690	--	--	--	--
Total	13,434	49,485	41,880	104,799	121,987	39,038	161,025	265,134
Residue, hardwood								
Michigan	66,217	--	22,868	89,085	16,140	--	16,140	105,225
Minnesota	--	40,297	--	40,297	--	4,183	4,183	44,480
Wisconsin	41,292	2,897	177,693	221,882	--	80	80	221,962
Exported 3/	--	384	--	384	--	--	--	--
Total	107,509	43,578	200,561	351,648	16,140	4,263	20,403	371,667
All wood material								
Michigan	1,340,589	--	28,152	1,368,741	16,140	2,580	18,720	1,387,461
Minnesota	--	1,264,448	26,320	1,290,768	--	8,167	8,167	1,298,935
Wisconsin	395,642	178,908	2,231,066	2,805,616	130,897	41,672	172,569	2,978,185
Exported 3/	14,948	40,946	--	55,894	--	--	--	--
Total	1,751,179	1,484,302	2,285,538	5,521,019	147,037	52,419	199,456	5,664,581

1/ Vertical columns of figures under box heading "Production by States" present the amount of pulpwood cut in each State.

2/ Mostly western States.

3/ Pulpwood shipped to mills outside of region.

4/ Ponderosa pine

5/ Includes ponderosa pine from other U.S.

Pulpwood production from softwoods climbed to a new high. Pulpwood output from softwood roundwood surpassed the peak set in 1980, and pulpwood output from softwood mill residue was second only to 1979. Harvesting of each softwood species group rose from 1981; the largest volume increase was in jack pine (70,000 cords). Red pine harvesting rose 61,000 cords to a record for the fifth straight year. White pine production inched up to a record for the third consecutive year.

Hardwood pulpwood production from Lake States mill residue fell 105,000 cords and production from hardwood roundwood fell 185,000 cords. By species, significant declines were in soft maple (42,000 cords), red oak (36,000 cords), aspen (36,000 cords), and hard maple (34,000 cords).

Lake States loggers produced 459,600 cords of whole-tree chips[5] (up 5 percent from 1981), which accounted for 8 percent of the pulpwood from all sources in 1982. More than one-fifth of the pulpwood produced in Michigan was whole-tree chips. Wisconsin produced nominal amounts of these chips. Production of whole-tree chips by species group and State was:

State	Softwoods	Aspen	Other hardwoods
	(Thousand cords)		
Michigan	15.1	225.0	138.5
Minnesota	—	68.1	2.9
Wisconsin	—	10.0	—

[5] *Pulpwood produced from chipping entire trees (all portions of trees above ground, except the stumps).*

Michigan—Michigan supplied 1.75 million cords of pulpwood, off 5 percent from 1981. Pulpwood demand was dampened by a strike at a Michigan mill during part of 1982. Production declines were largest in soft maple and hardwood mill residue used for pulp. Marquette, Iron, Menominee, and Delta Counties each produced more than 100,000 cords.

Minnesota—Minnesota production climbed 8 percent to 1.48 million cords. Gains were concentrated in aspen, jack pine, and tamarack. The aspen cut surpassed the previous record in 1979 by 28,000 cords and was 93 percent of the hardwood harvest. Top-producing counties that supplied 70 percent of the roundwood were St. Louis, Itasca, Koochiching, Beltrami, and Cass.

Wisconsin—Lower demand for Wisconsin aspen and hardwood mill residue were the key factors in the drop in total pulpwood output to 2.29 million cords. Most of the harvest decline was in the Northwestern Unit (fig. 1). Wisconsin loggers cut more than 200,000 cords of red pine for the first time, extending the consecutive record-setting red pine harvests to 5 years. Jack pine production eclipsed the record cut in 1978. Marinette, Bayfield, Oneida, Forest, Vilas, and Price Counties were the leading producers.

In this report we show the distribution of the harvest in two ways: first, the amount of pulpwood cut relative to the growing stock volume in major pulpwood species (fig. 1); and second, the amount of pulpwood cut relative to commercial forest area (fig. 2). Harvesting pressure slackened chiefly in the Northern Lower Peninsula of Michigan and to a moderate extent in the Northwestern and Central Units of Wisconsin. Other major pulpwood-producing areas had moderate harvest gains to slight declines from 1981. Pulpwood cutting is in a significant uptrend in Michigan's Southern Lower Peninsula although this Unit furnished only 4 percent of Michigan's roundwood pulpwood in 1982.

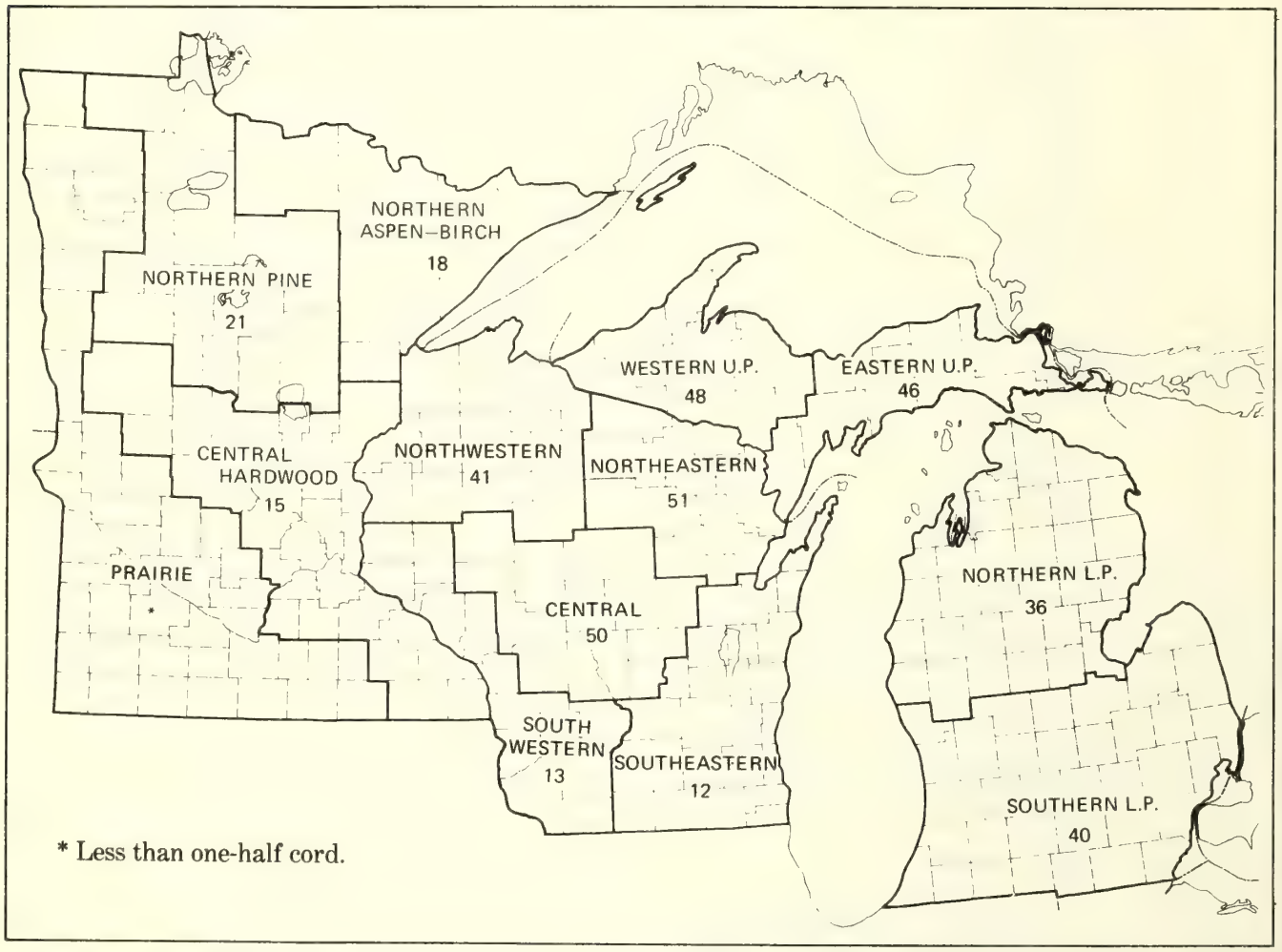


Figure 1.—*Cords of pulpwood (including chips from roundwood) harvested per 1,000 cords of merchantable volume in principal pulpwood species by Forest Survey Unit, 1982. Merchantable volume was determined during the last forest inventory in each State.*

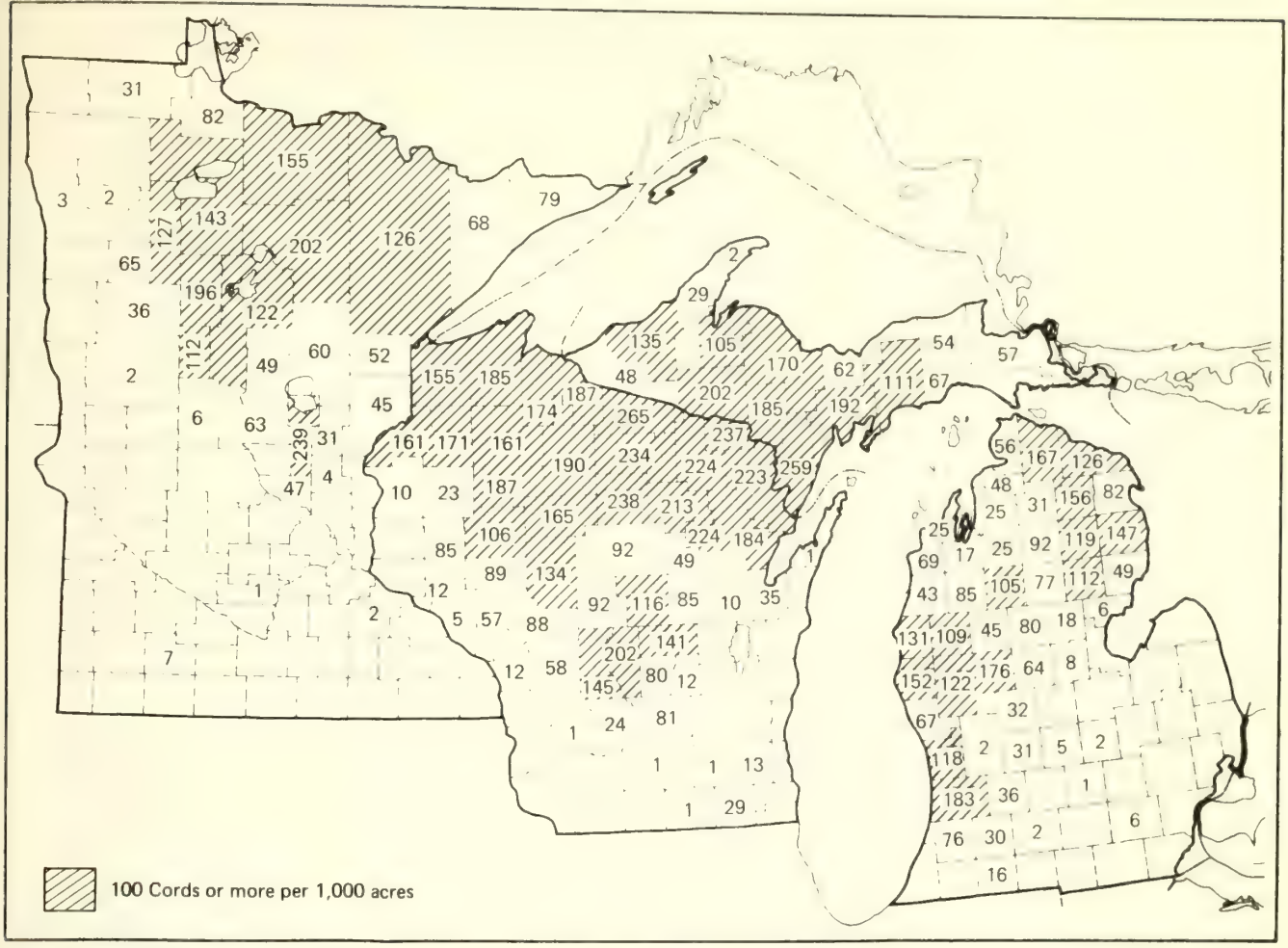


Figure 2.—*Cords of pulpwood cut per 1,000 acres of stocked commercial forest land in principal pulpwood-producing counties, 1982. Acres of stocked commercial forest land were determined during the last inventory in each State.*

Receipts

Thirty-eight pulp, 3 particleboard, 3 waferboard, and 2 oriented strand board mills received 5.66 million cords of pulpwood in 1982. Forty-one of the 46 operating mills used aspen and 19 used birch (table 2).

Softwood residue imports from Canada continued to fall and were less than half the level in 1980. Softwood residue received in the Lake States from other areas of the U.S. plunged for the third straight year to near the 1967 level; major suppliers were South Dakota and Wyoming.

Michigan—Only 3 percent of the 1.39 million cords received were from out-of-State. Hardwood mill residue was the primary import. Aspen, jack pine, soft maple, and red pine were the species most in demand.

Wisconsin—Twenty-five Wisconsin mills received 2.98 million cords including 396,000 cords from Michigan, 179,000 cords from Minnesota, 131,000 cords from other (primarily western) States, and 42,000 cords from Canada. Out-of-State sources provided nearly two-thirds of the spruce and four-fifths of the tamarack requirements. Canada and States outside the Lake States area supplied three-fourths of the softwood residue used by Wisconsin mills.

Industry Trends and Analysis

Average daily pulp production was 10,770 tons per day (table 3). Wisconsin's average daily pulp production almost equaled similar production in Michigan and Minnesota combined.

Michigan's first oriented strand board (OSB) plant began operations in 1982. Annual production capacity of the Lake States flakeboard plants was 780 million square feet as shown on the next page:

Table 2.--Numbers of industrial plants in the Lake States using a particular species or residue for pulping and flakeboard in 1982

Species and kind of material	Total Lake States	Michigan	Minnesota	Wisconsin
Aspen	41	9	12	20
Balsam fir	16	3	5	8
Birch	19	7	1	11
Hemlock	8	2	-	6
Pine	10	4	2	4
Spruce	15	2	5	8
Tamarack	8	1	3	4
Maple	15	7	-	8
Oak	16	7	-	9
Other hardwoods	21	7	5	9
Softwood residue	12	2	2	8
Hardwood residue	18	6	1	11
Total plants[1/]	46	9	12	25

[1/] Some plants use more than one species, so numbers in columns cannot be added.

Company	Location	Capacity Million square feet (¾-inch basis)
Champion International Corp.	Gaylord, MI	175
Weyerhaeuser Co.	Grayling, MI	105
Blandin Wood Products Co.	Grand Rapids, MN	135
Northwood Panelboard Co.	Bemidji, MN	80
Potlatch Corp.	Bemidji, MN	75
Louisiana - Pacific Corp.	Hayward, WI	130
Rodman Industries	Marinette, WI	15
Weyerhaeuser Co.	Marshfield, WI	65
		780

On a regional basis, Lake States mills are the dominant producers of waferboard and OSB in the U.S. Canada remains the leading producer of waferboard worldwide. These structural board plants are highly dependent on the housing industry for their markets.

Lake States pulpwood production for flakeboard plants in 1981 and 1982 was:

Species	Production 1981	1982
	(Thousand cords)	
Roundwood		
Aspen	382	554
Other species	54	48
Residue	60	73
Total	496	675

Housing starts in the U.S. fell in 1982 to 1,060,000 units, the lowest annual total since 1946. Despite this adverse housing market, Lake States pulpwood production for flakeboard rose 36 percent in 1982 because several plants had started or expanded operations since 1980 and were competing with the softwood plywood industry in the construction and remodeling markets.

Lake States pulpwood production for pulpmills fell 5.0 percent from 1981 to 4.85 million cords. This decline is only slightly greater than the 4.3 percent drop in paper and paperboard production in the U.S. in 1982. In the Lake States, the decline in pulpwood production for pulpmills was nearly offset by the increased pulpwood output for flakeboard plants.

Because demand for paper and new housing is higher in 1983, pulpwood production in the Lake States is likely to be up substantially from 1982.

Table 3.--Active woodpulp mills in the Lake States, by location, type of pulp produced, and average daily production, 1982

(In tons per 24 hours)[1/]

Company	Location	Average production				
		Total	Sulfite	Kraft	Groundwood and other mechanical	Semi-chemical
Michigan						
Abitibi-Price, Inc.	Alpena	430	--	--	430	--
Champion International	Ontonagon	440	--	--	--	440
Manistique Pulp and Paper Co.	Manistique	90	--	--	90	--
Mead Corp.	Escanaba	800	--	600	200	--
Menasha Corp.	Otsego	225	--	--	--	225
Packaging Corp. of America	Filer City	600	--	--	--	600
Warren Co., S.D.	Muskegon	250	--	250	--	--
Total	7 Mills	2,835	--	850	720	1,265
Minnesota						
Blandin Paper Co.	Grand Rapids	300	--	--	300	--
Hennepin Paper Co.	Little Falls	75	--	--	75	--
Boise Cascade Corp.	International Falls	920	--	380	540	--
Potlatch Corp.	Cloquet	475	--	475	--	--
Superwood Corp.	Bemidji	100	--	--	100	--
St. Regis Paper Co.	Sartell	385	--	--	385	--
Superwood Corp.	Duluth	350	--	--	350	--
Conwed Corp.	Cloquet	50	--	--	50	--
Certain-Teed Corp.	Shakopee	80	--	--	80	--
Total	9 Mills	2,735	--	855	1,880	--
Wisconsin						
James River Corp.	Green Bay	150	150	--	--	--
Weyerhaeuser Co.	Rothschild	200	200	--	--	--
Badger Paper Mills	Peshtigo	100	100	--	--	--
Appleton Papers Inc.	Combined Locks	200	--	--	200	--
Consolidated Papers, Inc.	Stevens Point	230	--	--	230	--
Consolidated Papers, Inc.	Wisconsin Rapids	750	--	450	300	--
Green Bay Packaging, Inc.	Green Bay	200	--	--	--	200
Flambeau Paper Co.	Park Falls	110	110	--	--	--
Midtec Paper Corp.	Kimberly	180	--	--	180	--
Pentair, Inc.	Niagara	210	--	--	210	--
Mosinee Paper Mills Co.	Mosinee	210	--	210	--	--
Nekoosa Papers, Inc.	Nekoosa	335	--	335	--	--
Nekoosa Papers, Inc.	Port Edwards	235	235	--	--	--
Owens-Illinois	Tomahawk	1,000	--	--	--	1,000
Procter and Gamble, Inc.	Green Bay	2/	2/	2/	2/	2/
Rhinelander Paper Co.	Rhinelander	75	75	--	--	--
Genstar Corp.	Cornell	100	--	--	100	--
Superior Fiber Products Co.	Superior	180	--	--	180	--
Thilmany Pulp and Paper Co.	Kaukauna	400	--	400	--	--
Tomahawk Pulp Co., Inc.	Tomahawk	50	--	--	50	--
Wausau Paper Mills Co.	Brokaw	185	185	--	--	--
Superwood Corp.	Phillips	100	--	--	100	--
Total	22 Mills	5,200	1,055	1,395	1,550	1,200
All states	38 Mills	10,770	1,055	3,100	4,150	2,465

1/ Lockwood's Directory of the Paper and Allied Industries -- 1983.

2/ Capacity not available.

CENTRAL STATES

Production

Pulpwood production plunged 17 percent to 356,000 cords (table 4). Seven out of 10 cords were residue from wood-using mills. Demand fell for roundwood in each species group and for Central States mill residue. Loggers cut the least soft hardwood pulpwood since these annual production studies were begun in 1955. Exports from the Central States, primarily hardwood residue, topped all previous years in volume and percentage terms. Mills in Kentucky, Michigan, Ohio, and Wisconsin received 71 percent of the pulpwood production.

Indiana, the leading producer, maintained production at the 1981 level. Output fell sharply in Illinois, Iowa, and Missouri. Illinois production fell below

Table 4.--Production and imports of pulpwood, Central States, 1982

(In standard cords, unpeeled)[1/]

Species and destination	Production by States[2/]					Imports			Total receipts
	Illinois	Indiana	Iowa	Missouri	Regional total	Lake States	Other U.S.	Total imports	
Roundwood									
Softwoods									
Exported[3/]	12,536	--	--	1,784	14,320	--	--	--	--
Total	12,536	--	--	1,784	14,320	--	--	--	--
Soft hardwoods									
Central States[4/]	3,462	9,771	2,518	5,693	21,444	--	1,187	1,187	22,631
Exported[3/]	8,400	--	--	1,286	9,686	--	--	--	--
Total	11,862	9,771	2,518	6,979	31,130	--	1,187	1,187	22,631
Hard hardwoods									
Central States[4/]	1,927	9,722	4,347	3,220	19,216	--	1,181	1,181	20,397
Exported[3/]	12,932	18,356	--	11,725	43,013	--	--	--	--
Total	14,859	28,078	4,347	14,945	62,229	--	1,181	1,181	20,397
Total roundwood									
Central States[4/]	5,389	19,493	6,865	8,913	40,660	--	2,368	2,368	43,028
Exported[3/]	33,868	18,356	--	14,795	67,019	--	--	--	--
Total	39,257	37,849	6,865	23,708	107,679	--	2,368	2,368	43,028
Residue, softwood									
Exported[3/]	3,157	--	3,635	2,108	8,900	--	--	--	--
Total	3,157	--	3,635	2,108	8,900	--	--	--	--
Residue, hardwood									
Central States[4/]	14,052	31,655	3,405	13,621	62,733	--	--	--	62,733
Exported[3/]	19,970	115,331	--	41,525	176,826	--	--	--	--
Total	34,022	146,986	3,405	55,146	239,559	--	--	--	62,733
All wood material									
Central States[4/]	19,441	51,148	10,270	22,534	103,393	--	2,368	2,368	105,761
Exported[3/]	56,995	133,687	3,635	58,428	252,745	--	--	--	--
Total	76,436	184,835	13,905	80,962	356,138	--	2,368	2,368	105,761

[1/] Factors used in converting to standard green cords (128 cu. ft. including bark and air space) were:
4,500 pounds of soft hardwood roundwood;
5,000 pounds of hard hardwood or coniferous roundwood;
4,100 pounds of softwood chips (green);
4,400 pounds of hardwood chips (green);
2,500 pounds of chips (all species, dry).

[2/] Vertical columns of figures under box heading--Production by States--present the amount of pulpwood cut in each State.

[3/] Pulpwood shipped to mills outside the region.

[4/] Combined to prevent disclosure of individual mill receipts.

100,000 cords for the first time since 1967. Production has not been as low since 1969 in Missouri and since 1955 in Iowa.

Loggers harvested pulpwood in 20 counties in Illinois, 20 counties in Indiana, 18 counties in Missouri, and 6 counties in Iowa (fig. 3). Logging areas were contracted in northeastern and north-central Illinois, northwestern Indiana, and eastern Iowa.

RECEIPTS

Three Central States pulpmills received 106,000 cords, down 45 percent from receipts at the 7 active mills in 1981, and the lowest since 1957. Every category of roundwood and residue showed lower receipts than in 1981. Three mill closings in Illinois and one in Iowa during 1981 led to the decline in receipts. All of the mills that closed manufactured products for the depressed housing market. Imports were only 2,000 cords.

INDUSTRY TRENDS AND ANALYSIS

Average daily pulp production fell to 470 tons per day (table 5), about one-third of the production in 1974. Depressed housing and related markets have led to 9 mill closures since 1979. Most of the closures are likely to be permanent.

Pulpwood export markets to surrounding States have become dominant and vital to Central States pulpwood producers because pulping capacity has declined in the Central States and increased in nearby States. Growing export markets have cushioned the drop in Central States pulpwood production. Exports

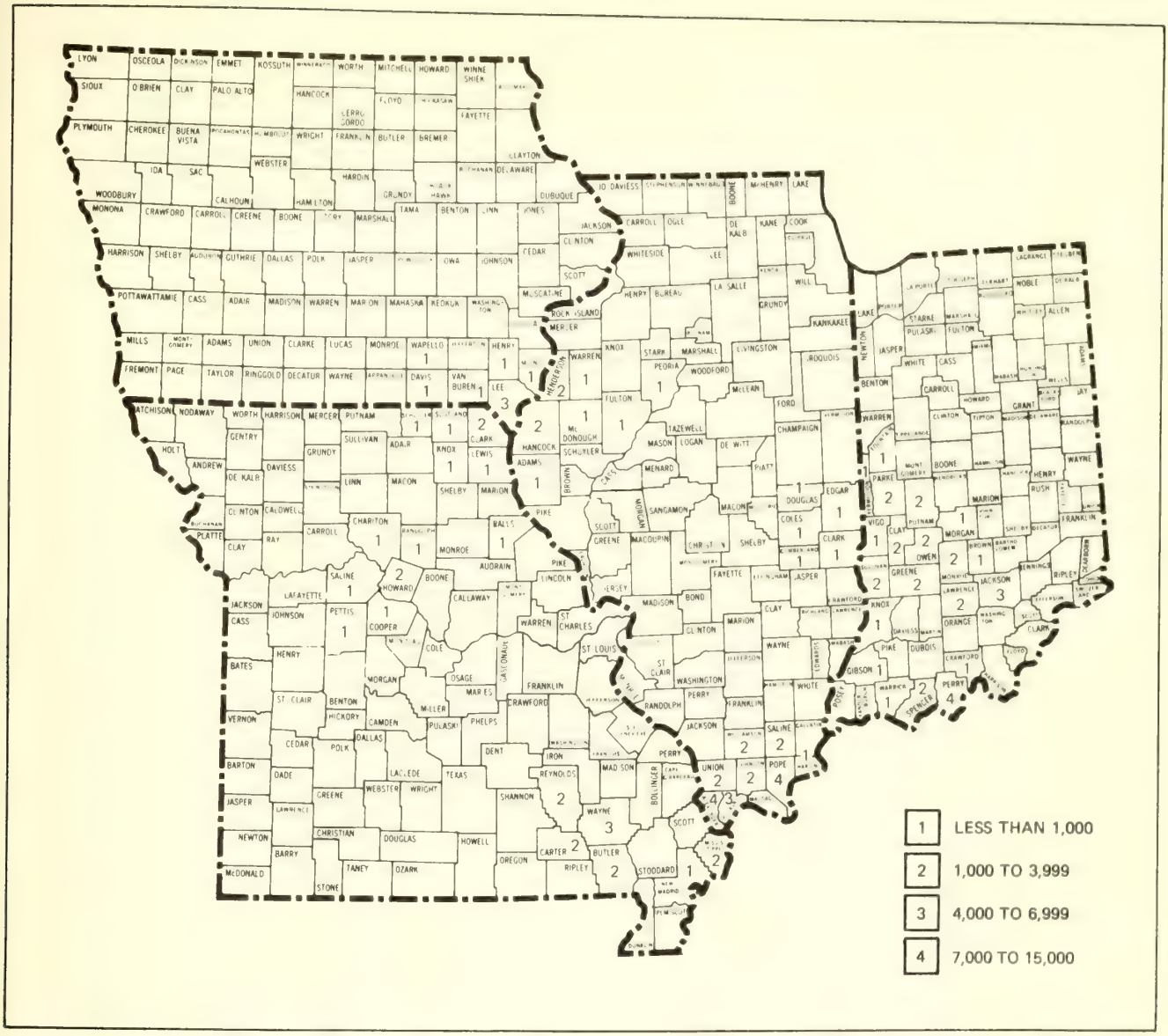


Figure 3.—*Production of pulpwood from roundwood (including chips from roundwood) in the Central States by counties, in standard cords, 1982.*

grew from 3 percent of the total production in 1967 to 71 percent in 1982 and have steadily grown in volume as shown below:

Year	Exports	Total production	Exports
	(Thousand cords)		(Percent)
1967	7	252	3
1972	158	463	34
1977	236	445	53
1982	253	356	71

Although markets for pulpwood within the Central States may improve, mills outside the Central States are likely to remain the major customers for Central States pulpwood.

Table 5.--Active woodpulp mills in the Central States, by location, type of pulp produced, and average daily production, 1982

(In tons per 24 hours)[1/]

Company	Location	Average production				
		Total	Sulfite	Kraft	Groundwood and other mechanical	Semi-chemical
Illinois (no current operations)						
Total	0 Mills	--	--	--	--	--
Indiana						
Weston Paper and Mfg. Co.	Terre Haute	270	--	--	--	270
Total	1 Mill	270	--	--	--	270
Iowa						
Consolidated Packaging Corp.	Fort Madison	140	--	--	--	140
Total	1 Mill	140	--	--	--	140
Missouri						
Huebert Fibreboard, Inc.	Booneville	60	--	--	60	--
Total	1 Mill	60	--	--	60	--
All states	3 Mills	470	--	--	60	410

[1/] Lockwood's Directory of the Paper and Allied Industries -- 1983.

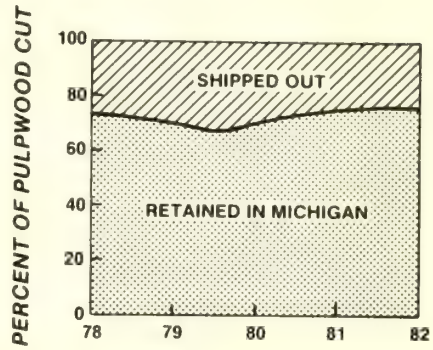
APPENDIX

Table 6.--Lake States pulpwood production[1/] by State of origin and destination, 1978-1982

(In thousand standard cords, unpeeled)

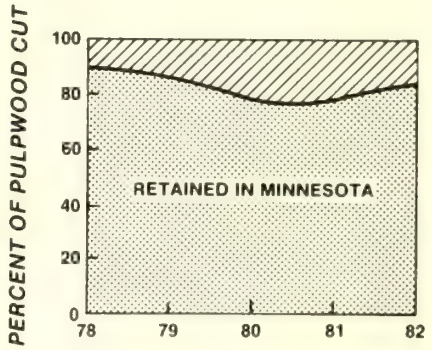
MICHIGAN

	Total cut	Destination of pulpwood			
		Minnesota	Wisconsin	Michigan	Other
978	1,675	-	404	1,248	23
979	1,981	(2/)	516	1,428	37
980	1,969	-	490	1,443	36
981	1,838	-	419	1,402	17
982	1,751	-	396	1,340	15
year average	1,843	(2/)	445	1,372	26



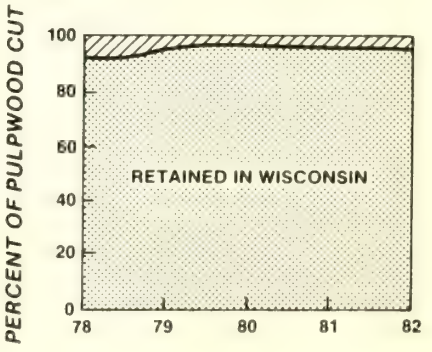
MINNESOTA

	Total cut	Destination of pulpwood			
		Minnesota	Wisconsin	Michigan	Other
978	1,338	1,155	162	-	21
979	1,458	1,226	169	-	63
980	1,333	1,044	216	-	73
981	1,371	1,119	177	-	75
982	1,484	1,264	179	-	41
year average	1,397	1,162	181	-	54



WISCONSIN

	Total cut	Destination of pulpwood			
		Minnesota	Wisconsin	Michigan	Other
978	1,895	26	1,779	70	20
979	2,109	20	2,024	47	18
980	2,362	18	2,297	35	12
981	2,389	34	2,320	26	9
982	2,286	27	2,231	28	-
year average	2,208	25	2,130	41	12



[1/] Production in 1978 does not include wood for particleboard or fiberboard plants.

[2/] Less than 500 cords.

Table 7.--Lake States pulpwood production by Forest Survey Unit and destination by State, 1982

(In hundred standard cords, unpeeled)

Unit	Total cut	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other
MICHIGAN					
Roundwood					
E. Upper Peninsula	4,256	3,153	--	998	105
W. Upper Peninsula	5,535	3,109	--	2,426	--
N. Lower Peninsula	5,849	5,740	--	64	45
S. Lower Peninsula	664	664	--	--	--
Total	16,304	12,666	--	3,488	150
Residue	1,209	740	--	469	--
Total pulpwood	17,513	13,406	--	3,957	150
MINNESOTA					
Roundwood					
Aspen-Birch	6,182	--	4,992	791	399
Northern Pine	7,080	--	6,189	891	--
Central Hardwood	646	--	614	32	--
Prairie	3	--	--	3	--
Total	13,911	--	11,795	1,717	399
Residue	931	--	848	72	11
Total pulpwood	14,842	--	12,643	1,789	410
WISCONSIN					
Roundwood					
Northeastern	8,750	51	--	8,699	--
Northwestern	8,315	--	263	8,052	--
Central	3,028	--	--	3,028	--
Southwestern	235	--	--	235	--
Southeastern	102	--	--	102	--
Total	20,430	51	263	20,116	--
Residue	2,424	231	--	2,193	--
Total pulpwood	22,854	282	263	22,309	--

Table 8.--Lake States pulpwood production[1/] from roundwood by species, State, and Forest Survey Unit, 1978-1982

(In thousand standard cords, unpeeled)

MICHIGAN

Unit	Aspen					Balsam fir					Birch					Hemlock				
	Annual production					Annual production					Annual production					Annual production				
	1978	1979	1980	1981	1982	1978	1979	1980	1981	1982	1978	1979	1980	1981	1982	1978	1979	1980	1981	1982
Eastern Upper Peninsula	103	125	116	89	93	44	43	57	57	56	28	35	29	36	31	24	26	32	23	30
Western Upper Peninsula	220	204	209	201	210	42	41	46	42	45	46	53	40	44	38	24	19	26	16	26
Northern Lower Peninsula	257	375	374	350	315	1	1	6	5	4	16	21	34	25	19	(2/)	--	(2/)	(2/)	(2/)
Southern Lower Peninsula	6	5	6	12	14	--	--	--	--	--	(2/)	(2/)	(2/)	(2/)	1	--	--	--	--	--
Total	586	709	705	652	632	87	85	109	104	105	90	109	103	105	89	48	45	58	39	56

MINNESOTA

Aspen-Birch	363	392	313	352	308	59	72	73	69	68	2	3	11	9	1	--	--	--	--	--
Northern Pine	306	404	357	422	504	37	46	38	31	38	5	1	4	2	2	--	--	--	--	--
Central Hardwood	35	41	29	27	54	--	(2/)	--	--	(2/)	2	3	(2/)	(2/)	(2/)	--	--	--	--	--
Prairie	--	1	(2/)	(2/)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	704	838	699	801	866	96	118	111	100	106	9	7	15	11	3	--	--	--	--	--

WISCONSIN

Northeastern	331	364	459	415	392	53	60	66	79	70	62	76	91	74	69	30	26	26	24	29
Northwestern	300	319	326	469	420	21	23	35	25	32	53	63	80	73	74	19	13	6	4	4
Central	37	66	85	79	71	1	1	1	1	1	6	11	15	12	11	4	1	2	1	(2/)
Southwestern	1	1	1	1	(2/)	--	--	--	(2/)	(2/)	(2/)	(2/)	(2/)	(2/)	(2/)	--	--	--	--	--
Southeastern	(2/)	1	2	1	1	(2/)	--	--	--	(2/)	(2/)	1	(2/)	(2/)	(2/)	--	--	--	--	--
Total	569	751	873	965	884	75	84	102	105	103	121	151	186	159	154	53	40	34	29	33
Lake States	1,959	2,298	2,277	2,418	2,382	258	287	322	309	314	220	267	304	275	246	101	85	92	68	89

(Table 8 continued on next page)

1/ Production in 1978 does not include wood for particleboard or waferboard plants.
2/ Less than 500 cords.
3/ Includes small quantity of cedar not shown in other parts of table.

(Table 8 continued)

MICHIGAN

Unit	Pine					Spruce					Tamarack					Other hardwoods				
	Annual production					Annual production					Annual production					Annual production				
	1978	1979	1980	1981	1982	1978	1979	1980	1981	1982	1978	1979	1980	1981	1982	1978	1979	1980	1981	1982
Eastern Upper Peninsula	85	119	70	56	77	25	21	34	24	33	1	1	3	3	3	73	83	124	119	97
Western Upper Peninsula	50	48	53	45	52	18	17	23	19	34	1	1	3	3	7	134	174	163	143	135
Northern Lower Peninsula	122	166	124	118	118	(2/)	1	1	2	1	--	--	--	--	--	179	194	206	194	128
Southern Lower Peninsula	20	17	21	18	15	--	--	--	--	--	--	--	--	--	--	3	5	8	17	36
Total	277	350	268	237	262	43	39	58	45	68	2	2	6	6	10	389	456	501	473	396

MINNESOTA

Aspen-Birch	89	75	66	71	92	126	119	127	93	98	18	18	22	11	24	17	18	30	31	27
Northern Pine	89	75	76	70	80	38	34	43	34	36	10	16	18	18	20	9	9	16	19	28
Central Hardwood	8	8	9	6	7	(2/)	(2/)	(2/)	(2/)	--	--	(2/)	(2/)	(2/)	(2/)	13	4	2	3	4
Prairie	--	--	--	(2/)	(2/)	(2/)	--	(2/)	(2/)	--	2	2	3	1	(2/)	--	--	(2/)	--	--
Total	186	158	151	147	179	164	153	170	127	134	30	36	43	30	44	39	31	48	53	59

WISCONSIN

Northeastern	98	95	95	111	156	16	14	27	22	23	2	1	2	1	2	113	150	181	154	134
Northwestern	122	113	113	131	141	3	4	5	5	5	1	1	1	3	4	159	165	186	160	152
Central	121	127	149	150	166	(2/)	(2/)	1	(2/)	(2/)	(2/)	(2/)	(2/)	1	1	91	121	82	70	53
Southwestern	11	20	22	20	23	--	--	(2/)	(2/)	(2/)	--	--	--	--	(2/)	8	4	4	3	(2/)
Southeastern	5	6	8	7	8	--	1	(2/)	--	--	--	--	--	--	--	2	1	2	2	1
Total	357	361	387	419	494	19	19	33	27	28	3	2	3	5	7	373	441	455	389	340
Lake States	820	869	806	803	935	226	211	261	199	230	35	40	52	41	61	801	928	1,004	915	795

(Table 8 continued on next page)

(Table 8 continued)

Unit	All species[3/] Annual production				
	1978	1979	1980	1981	1982
MICHIGAN					
Eastern Upper Peninsula	387	457	469	414	425
Western Upper Peninsula	537	561	566	517	554
Northern Lower Peninsula	575	759	745	693	585
Southern Lower Peninsula	29	27	35	48	66
Total	1,528	1,804	1,815	1,672	1,630
MINNESOTA					
Aspen-Birch	674	696	642	635	618
Northern Pine	494	585	552	597	708
Central Hardwood	58	56	40	36	65
Prairie	2	3	3	2	(2/)
Total	1,228	1,340	1,237	1,270	1,391
WISCONSIN					
Northeastern	706	786	947	880	875
Northwestern	678	701	752	870	832
Central	260	327	335	315	303
Southwestern	20	25	27	24	23
Southeastern	7	10	12	9	10
Total	1,671	1,849	2,073	2,098	2,043
Lake States	4,427	4,993	5,125	5,040	5,064

Table 9.--Lake States pulpwood production from roundwood by county and species group, 1982

(In standard cords, unpeeled)

MICHIGAN

Unit and County[1/]	All species	Species group										
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
E. Upper Peninsula												
Alger	29,847	363	2,740	3,499	2,234	3,112	725	1,447	145	250	2,009	800
Chippewa	39,910	370	3,782	2,545	15,703	615	740	2,945	319	206	5,606	745
Delta	110,272	1,753	17,322	4,545	5,640	12,567	2,867	8,783	1,102	510	24,425	5,348
Luce	25,147	138	3,402	6,317	5,267	115	311	3,605	193	51	2,585	262
Mackinac	34,499	356	4,380	1,838	801	210	420	3,365	84	772	8,775	1,179
Menominee	127,201	1,354	18,510	6,250	795	1,774	3,011	8,990	753	2,209	40,619	6,881
Schoolcraft	58,591	958	6,139	4,372	14,301	4,305	1,365	4,699	290	226	9,185	1,447
Total	425,467	5,292	56,275	29,366	44,741	22,698	9,439	33,834	2,886	4,224	93,204	16,662
W. Upper Peninsula												
Baraga	53,449	881	3,647	5,122	1,518	253	1,026	2,099	252	574	15,313	--
Dickinson	69,234	431	5,841	1,060	574	1,015	705	3,291	532	198	46,239	1,351
Gogebic	29,692	--	329	2,498	45	2,217	66	573	--	757	8,478	--
Houghton	14,495	--	913	598	317	63	--	563	3,415	120	2,977	--
Iron	131,906	630	11,569	2,976	4,509	2,898	1,655	12,262	1,307	984	44,412	2,603
Keweenaw	337	--	--	92	--	217	--	28	--	--	--	--
Marquette	164,295	4,470	21,724	11,945	23,190	5,121	5,888	14,303	1,342	609	30,290	5,826
Ontonagon	90,065	--	596	1,892	45	331	311	630	74	955	62,920	--
Total	553,473	6,412	44,619	26,183	30,198	12,115	9,651	33,749	6,922	4,197	210,629	9,780
N. Lower Peninsula												
Alcona	44,711	--	--	--	867	799	--	--	--	544	30,979	1,509
Alpena	17,087	--	84	--	347	312	--	19	--	393	11,991	614
Antrim	3,777	--	--	--	315	501	--	--	--	78	2,157	17
Arenac	567	--	--	--	300	--	--	--	--	--	102	--
Benzie	8,342	--	--	--	--	358	--	--	--	42	5,651	--
Charlevoix	6,554	--	--	--	154	--	--	--	--	25	4,779	5
Cheboygan	60,693	--	1,119	--	3,102	--	--	147	--	1,012	38,937	1,029
Clare	17,186	--	--	--	246	--	--	--	--	110	12,119	--
Crawford	25,192	--	38	--	11,904	144	--	2	--	15	9,603	44
Emmet	11,005	--	--	--	493	1,057	--	--	--	74	7,534	12
Gladwin	3,477	--	--	--	--	23	--	--	--	14	3,165	--
Grand Traverse	2,642	--	--	--	723	723	--	--	--	--	1,131	--
Iosco	11,034	--	--	--	4,641	1,929	--	--	--	85	2,397	126
Isabella	4,796	--	--	--	--	2,801	--	--	--	--	1,995	--
Kalkaska	6,033	--	--	--	1,729	1,581	--	--	--	19	2,075	-
Lake	32,680	--	--	--	6,765	6,765	--	--	--	68	5,618	--
Leelanau	1,927	--	--	--	--	46	--	--	--	10	1,404	--
Manistee	9,421	--	--	--	237	237	--	--	--	312	3,023	--
Mason	19,185	--	--	--	--	1,411	--	--	--	107	10,551	--
Mecosta	21,083	--	--	--	--	2,414	--	--	--	28	15,939	-
Midland	1,181	--	--	--	--	68	--	--	--	--	946	--
Missaukee	21,350	--	--	--	--	313	--	--	--	110	17,543	5
Montmorency	45,313	--	16	--	4,597	187	--	2	--	574	29,642	628
Newaygo	37,854	--	--	--	7,069	7,069	--	--	--	134	13,224	--
Oceana	21,870	--	--	--	--	3,064	--	--	--	134	8,940	--
Ogemaw	24,364	--	--	--	5,035	4,850	--	--	--	108	7,732	189
Osceola	7,059	--	--	--	--	437	--	--	--	--	5,964	--
Oscoda	36,409	--	--	10	8,935	4,548	--	--	--	178	18,375	550
Otsego	8,201	--	--	--	2,832	1,819	--	--	--	32	2,397	39
Presque Isle	33,654	--	2,631	--	3,034	--	--	605	--	691	17,782	743
Roscommon	19,100	--	--	--	2,314	47	--	--	--	203	13,506	70
Wexford	21,118	--	--	--	4,564	4,564	--	--	--	52	7,264	--
Total	584,865	--	3,888	10	70,203	48,067	--	775	--	5,152	314,465	5,580
S. Lower Peninsula												
Allegan	25,065	--	--	--	--	497	--	--	--	263	4,370	--
Barry	3,987	--	--	--	--	801	--	--	--	27	895	--
Berrien	22	--	--	--	--	22	--	--	--	--	--	--
Calhoun	162	--	--	--	--	162	--	--	--	--	--	--
Clinton	147	--	--	--	--	57	--	--	--	--	90	--
Eaton	19	--	--	--	--	19	--	--	--	--	--	--
Ingham	40	--	--	--	--	20	--	--	--	--	20	--
Ionia	1,145	--	--	--	--	--	--	--	--	399	347	--
Kalamazoo	2,010	--	--	--	--	283	--	--	--	18	373	--
Kent	254	--	--	--	--	2	--	--	--	--	252	--
Montcalm	4,455	--	--	--	--	1,615	--	--	--	3	2,648	--
Muskegon	10,690	--	--	--	--	4,011	--	--	--	49	2,452	--
Ottawa	9,176	--	--	--	--	7,026	--	--	--	16	1,088	--
St. Joseph	955	--	--	--	--	--	--	--	--	10	163	--
Shiawassee	111	--	--	--	--	111	--	--	--	--	--	--
Tuscola	12	--	--	--	--	12	--	--	--	--	--	--
Van Buren	7,763	--	--	--	--	154	--	--	--	82	1,301	--
Washtenaw	418	--	--	--	--	418	--	--	--	--	--	--
Total	66,431	--	--	--	--	15,210	--	--	--	867	13,999	--
State total	1,630,236	11,704	104,782	55,559	145,142	98,090	19,090	68,358	9,808	14,440	632,297	32,022

(Table 9 continued on next page)

(Table 9 continued)

MICHIGAN

Unit and County[1/]	Species group											
	Basswood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
E. Upper Peninsula												
Alger	400	1,091	1,109	794	--	4,537	--	2,628	1,607	112	15	230
Chippewa	372	633	1,141	621	--	552	--	1,386	1,498	62	--	69
Delta	1,956	2,062	6,365	2,682	--	2,162	--	4,757	5,041	18	5	362
Luce	131	265	353	244	--	678	--	558	626	22	--	24
Mackinac	589	1,446	1,733	982	--	873	--	3,676	2,813	98	--	109
Menominee	1,775	1,915	8,637	2,700	--	6,782	--	8,110	4,767	917	27	425
Schoolcraft	723	971	2,010	1,273	--	1,448	--	2,121	2,459	110	29	160
Total	5,946	8,383	21,348	9,296	--	17,032	--	23,236	18,811	1,339	76	1,379
W. Upper Peninsula												
Baraga	1,108	--	1,562	2,288	--	6,593	--	7,755	2,839	131	24	464
Dickinson	568	--	3,536	329	--	777	--	1,244	1,330	110	7	96
Gogebic	10	--	200	2,022	--	6,205	--	4,225	1,507	342	17	201
Houghton	64	--	711	537	--	1,823	--	1,548	680	28	--	138
Iron	1,245	--	6,043	3,982	--	14,910	--	11,932	5,727	554	113	1,595
Keweenaw	--	--	--	--	--	--	--	--	--	--	--	--
Marquette	2,696	3,180	8,787	4,175	--	4,777	--	7,315	7,565	558	15	519
Ontonagon	2,143	--	1,618	2,311	--	3,750	--	10,362	1,974	38	2	113
Total	7,834	3,180	22,457	15,644	--	38,835	--	44,381	21,622	1,761	178	3,126
N. Lower Peninsula												
Alcona	101	82	2,119	--	--	--	--	227	3,259	3,754	471	--
Alpena	47	75	951	--	--	--	--	207	1,829	192	26	--
Antrim	101	77	115	22	--	--	--	123	52	193	--	26
Arenac	--	--	18	--	--	--	--	--	147	--	--	--
Benzie	44	71	151	--	--	--	--	127	1,372	330	123	73
Charlevoix	18	14	273	10	--	--	--	128	683	457	7	1
Cheboygan	630	466	4,206	82	--	--	--	243	6,729	2,926	54	11
Clare	214	213	526	5	--	--	--	213	2,168	934	334	104
Crawford	39	88	598	--	--	--	--	--	1,233	995	461	28
Emmet	10	45	82	5	--	--	--	417	1,203	59	--	14
Gladwin	21	--	140	--	--	--	--	--	104	10	--	--
Grand Traverse	--	--	12	--	--	--	--	--	53	--	--	--
Iosco	17	12	322	--	--	--	--	35	547	815	108	--
Isabella	--	--	--	--	--	--	--	--	--	--	--	
Kalkaska	39	14	113	20	--	--	--	--	268	140	9	26
Lake	69	66	87	14	--	--	--	137	1,392	9,082	2,544	73
Leelanau	--	21	52	--	--	--	--	52	--	321	--	21
Manistee	104	454	202	--	--	--	--	320	3,796	312	312	112
Mason	--	197	157	--	--	--	--	108	3,083	3,269	229	73
Mecosta	--	--	111	--	--	--	--	88	442	1,693	368	--
Midland	--	--	84	--	--	--	--	--	83	--	--	--
Missaukee	221	86	447	9	--	--	--	461	1,584	393	81	97
Montmorency	224	153	2,347	--	--	--	--	158	4,283	2,295	170	37
Newaygo	62	52	187	52	--	--	--	152	1,403	5,940	2,465	45
Oceana	87	24	160	24	--	--	--	166	1,575	6,025	1,671	--
Ogemaw	122	18	651	--	--	--	--	102	2,575	2,625	357	--
Osceola	--	--	205	--	--	--	--	37	364	52	--	--
Oscoda	259	24	1,042	2	--	--	--	34	1,321	945	162	24
Otsego	53	36	202	8	--	--	--	7	464	300	2	10
Presque Isle	135	100	2,955	--	--	--	--	275	3,760	837	106	--
Roscommon	62	56	631	6	--	--	--	52	1,663	266	184	40
Wexford	52	52	95	--	--	--	--	186	3,124	1,040	73	52
Total	2,731	2,496	19,241	259	--	--	--	4,055	50,559	46,200	10,317	867
S. Lower Peninsula												
Allegan	277	231	249	231	257	257	231	231	3,855	8,327	5,789	--
Barry	29	24	26	24	27	27	24	24	404	961	694	--
Berrien	--	--	--	--	--	--	--	--	--	--	--	--
Calhoun	--	--	--	--	--	--	--	--	--	--	--	--
Clinton	--	--	--	--	--	--	--	--	--	--	--	--
Eaton	--	--	--	--	--	--	--	--	--	--	--	--
Ingham	--	--	--	--	--	--	--	--	--	--	--	--
Ionia	--	--	--	--	--	--	--	--	399	--	--	--
Kalamazoo	19	16	17	16	17	17	16	16	258	557	387	--
Kent	--	--	--	--	--	--	--	--	--	--	--	--
Montcalm	--	--	3	--	--	--	--	4	19	134	29	--
Muskegon	5	4	49	4	--	--	--	64	486	2,590	976	--
Ottawa	--	--	16	--	--	--	--	21	106	744	159	--
St. Joseph	11	9	10	9	10	10	9	9	151	327	227	--
Shiawassee	--	--	--	--	--	--	--	--	--	--	--	--
Tuscola	--	--	--	--	--	--	--	--	--	--	--	--
Van Buren	87	72	78	72	80	80	72	72	1,204	2,602	1,807	--
Washtenaw	--	--	--	--	--	--	--	--	--	--	--	--
Total	428	356	448	356	391	391	352	441	6,882	16,242	10,068	--
State total	16,939	14,415	63,494	25,555	391	56,258	352	72,113	97,874	65,542	20,639	5,372

(Table 9 continued on next page)

(Table 9 continued)

MINNESOTA

Unit and County[1/]	All species	Species group: Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
Aspen-Birch												
Carlton	15,971	--	158	--	674	466	121	1,095	90	--	12,153	1,214
Cook	42,450	--	9,537	--	8,385	33	54	14,595	--	--	9,846	--
Koochiching	196,458	--	26,042	--	13,684	2,333	1,074	48,691	16,764	62	80,192	6,798
Lake	57,967	--	7,063	--	3,005	1,650	2,783	13,302	2,045	--	27,102	656
St. Louis	305,393	--	24,535	--	41,557	9,213	7,347	20,237	5,097	3,120	178,672	15,040
Total	618,239	--	67,335	--	67,305	13,695	11,379	97,920	23,996	3,182	307,965	23,708
Northern Pine												
Aitkin	40,372	--	380	--	355	251	60	242	863	--	33,973	4,248
Becker	11,224	--	--	--	2,752	269	83	--	27	--	7,329	764
Beltrami	111,191	--	5,595	--	7,336	1,520	214	8,863	10,279	42	69,587	6,902
Cass	103,876	--	2,572	--	15,849	2,320	291	569	199	32	79,444	1,556
Clearwater	38,116	--	1,519	--	1,671	543	83	2,044	456	42	29,426	2,107
Crow Wing	18,042	--	--	--	6,426	695	--	--	--	--	10,921	--
Hubbard	78,060	--	183	--	4,691	849	264	304	180	--	67,382	4,139
Itasca	254,148	--	27,584	--	10,040	1,723	609	9,452	2,570	--	194,597	7,389
Lake of the Woods	28,356	--	641	--	9,249	223	42	9,795	4,323	--	3,777	306
Mahnomen	6,857	--	--	--	223	42	14	--	1,309	--	4,960	309
Roseau	5,901	--	--	--	1,233	83	28	4,054	27	--	427	49
Wadena	11,946	--	--	--	8,271	1,139	181	--	14	--	2,296	45
Total	708,089	--	38,474	--	68,096	9,657	1,869	35,323	20,247	116	504,119	27,814
Central Hardwood												
Goodhue	102	--	--	--	33	69	--	--	--	--	--	--
Isanti	167	--	12	--	42	106	7	--	--	--	--	--
Kanabec	3,902	--	--	--	--	--	--	--	--	--	3,902	--
Mille Lacs	28,914	--	--	--	209	23	--	--	24	36	28,324	--
Morrison	9,201	--	--	--	209	23	--	--	111	--	8,858	--
Otter Tail	380	--	--	--	--	--	--	--	--	--	380	--
Pine	18,694	--	--	--	1,754	1,167	316	--	--	--	12,018	3,439
Sherburne	2,638	--	--	--	79	2,546	13	--	--	--	--	--
Todd	612	--	--	--	209	23	--	--	--	--	380	--
Winona	16	--	--	--	16	--	--	--	--	--	--	--
Total	64,626	--	12	--	2,551	3,957	336	--	135	36	53,862	3,439
Prairie												
Cottonwood	14	--	--	--	14	--	--	--	--	--	--	--
Polk	206	--	--	--	--	--	--	--	206	--	--	--
Red Lake	53	--	--	--	26	27	--	--	--	--	--	--
Sibley	12	--	--	--	--	12	--	--	--	--	--	--
Total	285	--	--	--	40	39	--	--	206	--	--	--
State total	1,391,239	--	105,821	--	137,992	27,348	13,584	133,243	44,584	3,334	865,946	54,961

Unit and County[1/]	Species group: Basswood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
Aspen-Birch												
Carlton	--	--	--	--	--	--	--	--	--	--	--	--
Cook	--	--	--	--	--	--	--	--	--	--	--	--
Koochiching	--	--	506	--	--	--	--	312	--	--	--	--
Lake	--	--	361	--	--	--	--	--	--	--	--	--
St. Louis	--	--	513	--	--	--	--	62	--	--	--	--
Total	--	--	1,380	--	--	--	--	374	--	--	--	--
Northern Pine												
Aitkin	--	--	--	--	--	--	--	--	--	--	--	--
Becker	--	--	--	--	--	--	--	--	--	--	--	--
Beltrami	42	--	686	--	--	--	--	125	--	--	--	--
Cass	--	--	1,000	--	--	24	--	9	11	--	--	--
Clearwater	10	--	153	--	--	--	--	62	--	--	--	--
Crow Wing	--	--	--	--	--	--	--	--	--	--	--	--
Hubbard	16	--	52	--	--	--	--	--	--	--	--	--
Itasca	79	--	80	--	--	--	--	25	--	--	--	--
Lake of the Woods	--	--	--	--	--	--	--	--	--	--	--	--
Mahnomen	--	--	--	--	--	--	--	--	--	--	--	--
Roseau	--	--	--	--	--	--	--	--	--	--	--	--
Wadena	--	--	--	--	--	--	--	--	--	--	--	--
Total	147	--	1,971	--	--	24	--	221	11	--	--	--
Central Hardwood												
Goodhue	--	--	--	--	--	--	--	--	--	--	--	--
Isanti	--	--	--	--	--	--	--	--	--	--	--	--
Kanabec	--	--	--	--	--	--	--	--	--	--	--	--
Mille Lacs	--	--	53	--	--	67	--	26	16	87	49	--
Morrison	--	--	--	--	--	--	--	--	--	--	--	--
Otter Tail	--	--	--	--	--	--	--	--	--	--	--	--
Pine	--	--	--	--	--	--	--	--	--	--	--	--
Sherburne	--	--	--	--	--	--	--	--	--	--	--	--
Todd	--	--	--	--	--	--	--	--	--	--	--	--
Winona	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	53	--	--	67	--	26	16	87	49	--
Prairie												
Cottonwood	--	--	--	--	--	--	--	--	--	--	--	--
Polk	--	--	--	--	--	--	--	--	--	--	--	--
Red Lake	--	--	--	--	--	--	--	--	--	--	--	--
Sibley	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--	--	--	--	--	--
State total	147	--	3,404	--	--	91	--	621	27	87	49	--

(Table 9 continued on next page)

(Table 9 continued)

WISCONSIN

Unit and County 1/	All species	Species group										
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
Northeastern												
Florence	61,422	--	4,615	1,996	3,222	2,942	412	1,405	81	442	35,237	--
Forest	116,066	--	17,950	1,446	2,244	8,471	143	7,252	262	1,442	42,377	--
Langlade	80,468	--	6,150	524	583	2,571	--	1,193	461	1,612	40,165	--
Lincoln	93,838	--	3,239	611	1,373	3,206	642	1,023	1,057	2,576	59,348	--
Marinette	142,872	--	11,978	3,292	23,638	11,883	725	4,190	80	923	71,197	--
Menominee	48,109	--	75	17,616	3,569	958	2,311	25	--	401	16,350	--
Oconto	64,561	--	900	630	9,960	10,485	749	144	--	426	35,801	--
Oneida	131,195	--	15,718	753	10,322	11,762	1,235	4,971	427	1,988	48,308	--
Shawano	23,531	--	25	1,336	831	6,096	277	--	26	247	8,804	--
Vilas	112,930	--	9,478	1,047	17,932	15,527	1,705	2,517	30	799	34,931	--
Total	874,992	--	70,128	29,251	73,674	73,901	8,199	22,720	2,424	10,856	392,518	--
Northwestern												
Ashland	89,033	--	12,267	505	1,958	3,643	516	2,590	1,029	1,739	37,482	--
Barron	3,425	--	14	--	747	1,159	12	--	--	8	1,121	--
Bayfield	139,668	--	2,589	105	17,403	6,810	1,281	167	57	519	90,746	809
Burnett	50,183	--	--	--	19,205	3,150	70	88	23	4	27,146	--
Douglas	92,418	--	1,242	--	40,788	8,515	252	53	36	238	36,731	405
Iron	68,943	--	1,435	883	319	1,075	613	314	92	1,852	42,962	--
Polk	2,194	--	--	55	2,106	26	--	--	--	--	--	--
Price	111,780	--	7,015	785	1,105	4,950	201	1,339	1,725	6,850	34,853	--
Rusk	60,194	--	56	494	7	1,512	22	--	--	4,111	29,350	--
Sawyer	97,395	--	4,754	412	507	1,259	11	463	51	2,295	62,092	--
Taylor	58,859	--	2,296	404	14	2,036	--	212	696	2,616	24,376	--
Washburn	57,474	--	638	--	10,368	9,043	187	81	10	380	33,008	--
Total	831,566	--	32,306	3,643	94,527	43,178	3,165	5,307	3,719	20,612	419,867	1,214
Central												
Adams	49,375	--	--	--	14,779	25,915	1,521	--	23	42	545	--
Chippewa	21,548	--	11	12	1,576	1,258	--	14	--	728	9,766	--
Clark	35,738	--	24	35	2,385	3,472	16	--	--	597	15,884	--
Eau Claire	13,415	--	--	--	6,552	3,081	222	--	--	93	1,716	--
Jackson	29,558	--	--	--	15,302	6,398	305	--	--	246	2,625	--
Juneau	33,777	--	--	--	18,417	5,068	1,293	--	--	80	2,239	--
Marathon	33,371	--	545	263	1,490	3,366	249	33	--	540	18,715	--
Marquette	7,603	--	--	--	1,158	3,932	61	--	--	--	590	--
Monroe	12,093	--	--	--	7,751	2,479	75	--	--	84	324	--
Portage	17,904	--	71	87	3,133	5,078	1,063	--	873	88	4,486	--
Waupaca	13,248	--	--	86	1,177	3,998	583	22	--	121	5,375	--
Waushara	16,091	--	--	--	2,113	12,912	1,009	--	--	--	--	--
Wood	19,074	--	--	--	3,198	2,360	1,341	55	26	310	8,307	--
Total	302,795	--	651	483	79,031	79,317	7,738	124	922	2,929	70,572	--
Southwestern												
Buffalo	746	--	--	--	11	644	34	--	--	--	57	--
Crawford	1	--	--	--	--	--	--	--	--	--	1	--
Dunn	11,442	--	--	--	3,036	7,635	335	24	--	8	319	--
La Crosse	1,102	--	--	--	712	379	--	--	--	--	11	--
Pepin	508	--	--	--	97	299	44	28	10	--	30	--
Pierce	21	--	11	--	--	--	--	--	--	--	--	--
Richland	50	--	--	--	38	12	--	--	--	--	--	--
Sauk	3,609	--	--	--	542	2,729	171	--	--	2	--	--
Trempealeau	6,030	--	--	--	150	5,537	235	108	--	--	--	--
Vernon	11	--	--	--	--	11	--	--	--	--	--	--
Total	23,520	--	11	--	4,586	17,246	819	160	10	10	418	--
Southeastern												
Brown	1,247	--	--	--	335	441	--	--	--	--	471	--
Columbia	6,503	--	--	--	510	4,351	586	--	--	10	--	--
Dane	62	--	--	--	--	62	--	--	--	--	--	--
Door	63	--	--	--	--	--	--	--	--	--	63	--
Green	9	--	--	--	--	9	--	--	--	--	--	--
Green Lake	312	--	--	--	14	182	43	--	--	4	--	--
Jefferson	20	--	--	--	--	--	--	--	--	--	20	--
Kewaunee	11	--	--	--	--	--	--	--	--	--	--	--
Outagamie	663	--	--	--	8	219	99	--	--	3	291	--
Rock	25	--	--	--	--	25	--	--	--	--	--	--
Sheboygan	5	--	5	--	--	--	--	--	--	--	--	--
Walworth	716	--	--	--	22	528	166	--	--	--	--	--
Waukesha	561	--	--	--	--	530	31	--	--	--	--	--
Winnebago	27	--	--	--	--	27	--	--	--	--	--	--
Total	10,224	--	5	--	889	6,374	925	--	--	17	845	--
State total	2,043,097	--	103,101	33,377	252,707	220,016	20,846	28,311	7,075	34,424	884,220	1,214

(Table 9 continued on next page)

(Table 9 continued)

WISCONSIN

Unit and County[1/]	Species group											
	Basswood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
Northeastern												
Florence	14	--	3,178	878	--	1,694	--	3,543	1,104	513	111	35
Forest	1,257	1	9,912	1,418	--	6,256	--	10,343	4,045	543	149	555
Langlade	425	--	5,433	1,506	--	4,557	97	10,178	4,043	485	25	460
Lincoln	1,504	--	4,871	891	--	3,348	--	5,494	3,183	1,316	--	156
Marinette	51	1	4,513	169	--	1,679	--	3,401	2,684	1,931	452	85
Menominee	--	--	392	436	--	1,607	--	2,111	1,386	676	196	--
Oconto	15	--	1,627	56	--	1,029	--	1,098	990	490	125	36
Oneida	1,598	--	16,026	1,669	--	1,162	--	7,656	4,388	2,585	211	416
Shawano	1	--	396	253	--	2,229	268	1,247	758	585	94	58
Vilas	1,126	--	13,527	1,706	--	1,523	--	6,686	1,851	2,174	281	90
Total	5,991	2	59,875	8,982	--	25,084	365	51,757	24,432	11,298	1,644	1,891
Northwestern												
Ashland	68	--	8,186	2,057	--	4,305	--	8,019	3,934	617	3	115
Barron	1	--	309	--	--	5	--	3	6	25	15	--
Bayfield	4	--	11,099	386	--	469	--	1,405	855	4,963	1	--
Burnett	--	--	42	--	--	11	--	228	200	12	4	--
Douglas	--	--	3,665	24	--	38	--	251	167	11	1	1
Iron	745	--	5,202	1,505	--	1,459	--	6,751	2,957	597	--	182
Polk	--	--	--	--	--	--	--	4	3	--	--	--
Price	946	--	13,755	2,928	--	5,277	--	15,217	12,371	1,933	85	445
Rusk	1,598	--	5,572	751	--	2,638	52	5,500	3,847	3,845	573	266
Sawyer	1,190	--	10,123	1,210	--	1,087	--	7,619	2,670	1,304	160	188
Taylor	190	--	2,710	2,889	--	6,349	--	7,675	5,174	984	216	22
Washburn	--	--	1,925	18	--	86	--	747	588	291	81	23
Total	4,742	--	62,588	11,768	--	21,724	52	53,419	32,772	14,582	1,139	1,242
Central												
Adams	--	--	68	1	--	28	--	25	62	4,643	1,722	1
Chippewa	528	--	2,439	732	--	1,032	10	1,214	1,057	815	346	10
Clark	97	--	2,689	459	--	1,143	--	1,255	841	4,324	2,489	28
Eau Claire	4	--	194	29	--	151	--	136	242	799	179	17
Jackson	--	2	508	75	--	416	--	386	532	1,967	747	49
Juneau	--	--	377	5	--	165	--	144	233	4,086	1,666	4
Marathon	60	--	1,180	871	--	2,349	35	1,940	944	613	166	12
Marquette	--	--	156	--	--	156	--	208	156	770	416	--
Monroe	--	--	101	4	--	188	--	222	240	497	127	1
Portage	4	--	219	54	--	246	--	256	236	1,297	706	7
Waupaca	4	--	143	24	--	325	21	261	333	605	159	11
Waushara	--	--	--	--	--	--	--	--	--	57	--	--
Wood	--	--	308	66	--	228	--	250	254	1,740	626	5
Total	697	2	8,382	2,320	--	6,427	66	6,297	5,130	22,213	9,349	145
Southwestern												
Buffalo	--	--	--	--	--	--	--	--	--	--	--	--
Crawford	--	--	--	--	--	--	--	--	--	--	--	--
Dunn	--	--	10	--	--	32	--	19	19	--	--	5
La Crosse	--	--	--	--	--	--	--	--	--	--	--	--
Pepin	--	--	--	--	--	--	--	--	--	--	--	--
Pierce	--	--	--	--	--	--	--	--	--	10	--	--
Richland	--	--	--	--	--	--	--	--	--	--	--	--
Sauk	--	--	4	--	--	6	--	11	11	97	36	--
Trempealeau	--	--	--	--	--	--	--	--	--	--	--	--
Vernon	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	14	--	--	38	--	30	30	107	36	5
Southeastern												
Brown	--	--	--	--	--	--	--	--	--	--	--	--
Columbia	--	2	56	1	--	37	--	111	47	482	304	6
Dane	--	--	--	--	--	--	--	--	--	--	--	--
Door	--	--	--	--	--	--	--	--	--	--	--	--
Green	--	--	--	--	--	--	--	--	--	--	--	--
Green Lake	--	--	7	--	--	11	--	18	18	11	4	--
Jefferson	--	--	--	--	--	--	--	--	--	--	--	--
Kewaunee	--	--	--	--	--	--	--	6	5	--	--	--
Outagamie	--	--	5	--	--	7	--	11	12	7	1	--
Rock	--	--	--	--	--	--	--	--	--	--	--	--
Sheboygan	--	--	--	--	--	--	--	--	--	--	--	--
Walworth	--	--	--	--	--	--	--	--	--	--	--	--
Waukesha	--	--	--	--	--	--	--	--	--	--	--	--
Winnebago	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	2	68	1	--	55	--	146	82	500	309	6
State total	11,430	6	130,927	23,071	--	53,328	483	111,649	62,446	48,700	12,477	3,289

[1/] Includes only those counties that supplied pulpwood in 1982.

Table 10.--Central States pulpwood production by State and destination, 1978-1982.

(In thousand standard cords, unpeeled)

Year	Illinois			Indiana			Iowa			Missouri		
	Total	Destination		Total	Destination		Total	Destination		Total	Destination	
		Central States	Other States		Central States	Other States		Central States	Other States		Central States	Other States
1978	100	49	51	190	81	109	42	40	2	99	42	57
1979	102	52	50	204	89	115	69	56	13	101	42	59
1980	102	45	57	178	69	109	44	39	5	105	38	67
1981	100	43	57	185	68	117	32	26	6	111	44	67
1982	76	19	57	185	51	134	14	10	4	81	23	58

Table 11.--Trends in receipts of roundwood and residue as pulpwood, Central States, 1978-1982

(In thousand standard cords, unpeeled)

Type of material and Area	1978	1979	1980	1981	1982
Roundwood					
Illinois	30	33	19	19	--
Indiana, Iowa, Missouri	70	96	75	60	40
Total	100	129	94	79	40
Residue					
Illinois	54	59	28	3	--
Indiana, Iowa, Missouri	95	107	99	112	63
Total	149	166	127	115	63
All material	249	295	221	194	104

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Blyth, James E.; Smith, W. Brad.
Pulpwood production in the north-central region, by county, 1982. Resour. Bull. NC-79. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1984. 22 p.

Discusses 1982 production and receipts and recent production for other years in the Lake and Central States. Shows Michigan, Minnesota, and Wisconsin production by species for each county and compares production by Forest Survey Unit with that of previous years. Presents 1982 production and receipt data for Illinois, Indiana, Iowa, and Missouri, and shows four production classes by county.

KEY WORDS: Roundwood, residue, receipts, Lake States, Central States.

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Bulletin **NC-80**

Primary Forest Products Industry and Timber Use, Nebraska, 1980

James E. Blyth, Tom D. Wardle, and W. Brad Smith

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FOREWORD

This Bulletin contains the results of a detailed study of forest industry, timber products output from roundwood, and associated primary mill wood and bark residue in Nebraska in 1980. Such detailed information is necessary for intelligent planning and decisionmaking in wood procurement, forest resource management, and forest industry development. Likewise, researchers need current forest industry and timber products output information to plan projects.

Special thanks are given to the primary wood-using firms that supplied information for this study. Their cooperation is greatly appreciated.

Quantities shown may vary slightly from one table to another because of rounding differences, but these differences are insignificant.

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PRIMARY FOREST PRODUCTS INDUSTRY AND TIMBER USE, NEBRASKA, 1980

James E. Blyth, *Principal Market Analyst, St. Paul, Minnesota*
Tom D. Wardle, *Forest Resource Planner, Department of Forestry, Fisheries and Wildlife, University of Nebraska, Lincoln, Nebraska, and* **W. Brad Smith,** *Mensurationist, St. Paul, Minnesota*

HIGHLIGHTS

- The number of active primary wood-using mills fell sharply from approximately 198 in 1953 to 46 in 1980. Forty-two of the 46 mills in 1980 were sawmills; nearly two-thirds of the sawmills were in the Eastern Forest Survey Unit (fig. 1).
- Timber products output (TPO) from roundwood climbed 161 percent between 1953 and 1980 to 15.3 million cubic feet. Harvest gains were chiefly in oak, cottonwood, green ash, and hackberry. These were also the principal species harvested in 1980, supplying 72 percent of the roundwood.
- Average annual lumber production at sawmills increased from 43,000 board feet in 1953 to 498,000 board feet in 1980. In 1953, the largest sawmill produced about 700,000 board feet. In 1980, 7 mills each sawed 1 million or more board feet of lumber.
- About four-fifths (79 percent) of the TPO came from the Eastern Unit.

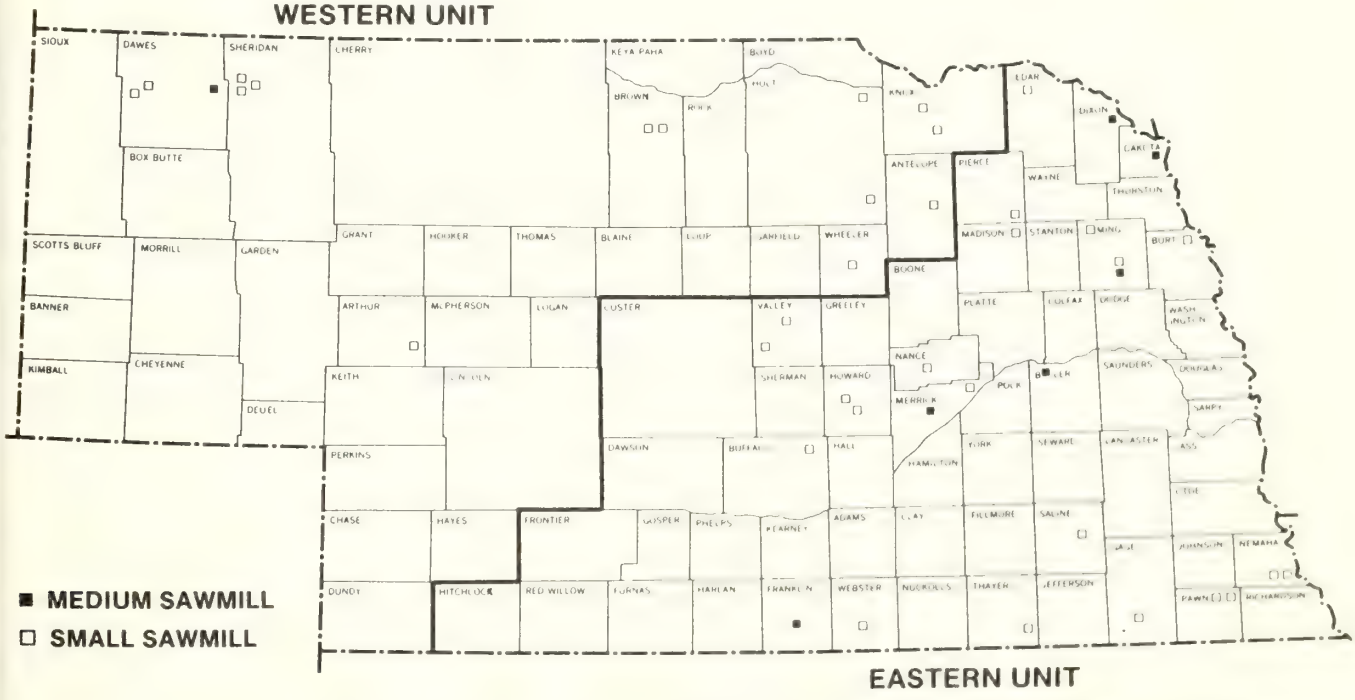

Figure 1.—*Active sawmills and Forest Survey Units in Nebraska, 1980. Sawmills are classed by volume of lumber produced in 1980: medium = 1 to 5 million board feet; small = less than 1 million board feet. Forest Survey Units are the geographic areas used by the Forest Inventory and Analysis Project to report periodic inventories and use of the Nations' forest resources.*

- Estimated fuelwood production from roundwood was 169,000 cords, accounting for 78 percent of the State's roundwood harvest. Fuelwood production from roundwood in 1980 was 1.9 times greater than that produced in 1953.
- Saw log production was 19.0 million board feet, up 132 percent from 1953. Cottonwood accounted for most of the increase, as well as 81 percent of the harvest in 1980. Other important species cut for saw logs were ponderosa pine and black walnut.
- Most of the saw log production was processed in Nebraska. Only 900,000 board feet were exported, primarily to Kansas. The Eastern Unit led in production (16.1 million board feet). Ponderosa pine was the major saw log species cut in the Western Unit.
- Counties each producing more than 1 million board feet of saw logs were (in order of importance) Sioux, Madison, Cuming, and Pierce. These counties furnished 24 percent of the Nebraska saw log harvest.
- Nebraska sawmills received 20.9 million board feet of logs in 1980. South Dakota supplied 2.2 million board feet; small amounts were supplied by Iowa, Kansas, and Missouri. Ninety-five percent of the imported volume was cottonwood.
- Sawmills in the Eastern Unit received 90 percent of all saw log receipts in Nebraska. Western Unit sawmills sawed all but a nominal amount of the ponderosa pine receipts.
- All of the imported saw logs were shipped to Eastern Unit sawmills.
- An estimated 331,000 posts were cut in Nebraska, down 37 percent from 1953. Osage-orange and ponderosa pine were the preferred species.
- During 1980, on a green weight basis, Nebraska primary wood-using mills generated 28,600 tons of coarse (chippable) wood residue, 17,300 tons of fine wood residue, and 12,600 tons of bark. Fuel was the dominant use for coarse wood and bark residue. Forty-two percent of the bark, 36 percent of the coarse wood residue, and 21 percent of the fine wood residue was not used for any purpose.

APPENDIX

STUDY METHODS

Except for fuelwood and posts, data for this publication came from canvassing all of the known primary wood-using mills that use Nebraska logs and bolts. All canvassing in Nebraska was done with a formal questionnaire by mail, telephone, or personal contact by the Nebraska Forest Service (NFS). For a few Nebraska mills that did not furnish complete data, NFS utilization and marketing specialists provided estimates based on prior knowledge and contacts. Similar cooperative studies in other North Central States by the North Central Forest Experiment Station and State forest agencies provided data from out-of-State mills that used Nebraska logs and bolts.

General offices of railroads serving Nebraska were solicited by the Station to determine the volume of veneer logs shipped from Nebraska to seaports for export overseas.

Fuelwood and post production for 1980 in Nebraska were estimated by the NFS based on recent production studies, records, and discussions with others knowledgeable about these products.

The Station edited and compiled the data.

SAMPLING ERROR

Because all primary wood-using mills were canvassed, there is no sampling error for the roundwood products they use.

DEFINITION OF TERMS

Roundwood.—Logs, bolts, or other round sections cut from trees (including chips from roundwood).

Timber products output from roundwood.—Logs and bolts (including chips from roundwood) harvested for saw logs, veneer logs, cooperage logs, pulpwood, posts, fuelwood, and other products.

Forest Survey Unit.—A geographical area (group of counties) used by the Forest Inventory and Analysis Project to report periodic inventories and use of the Nation's forest resources.

Primary wood-using mills.—Mills using roundwood products (including chips from roundwood).

Primary wood-using mill residue.—Wood materials (coarse and fine) and bark not utilized for principal products at mills using roundwood. These residues include wood products (byproducts) obtained incidental to production of principal products and wood materials not utilized for some product.

Coarse mill residue.—Wood residue suitable for chipping such as slabs, edgings, and veneer cores.

Fine mill residue.—Wood residue not suitable for chipping such as sawdust and veneer clippings.

COMMON AND SCIENTIFIC NAMES OF TREE SPECIES IN NEBRASKA

SOFTWOODS

- Ponderosa pine ..... *Pinus ponderosa*
- Redcedar (eastern)..... *Juniperus virginiana*

HARDWOODS

- Ash
  - Green ash ..... *Fraxinus pennsylvanica*
  - White ash ..... *Fraxinus americana*
- Aspen (quaking) ..... *Populus tremuloides*
- Balsam poplar ..... *Populus balsamifera*
- Basswood (American) ..... *Tilia americana*
- Boxelder ..... *Acer negundo*
- Cherry (black) ..... *Prunus serotina*
- Catalpa (northern) ..... *Catalpa speciosa*
- Cottonwood
  - Eastern cottonwood ..... *Populus deltoides*
  - Plains cottonwood ..... *Populus sargentii*
- Elm
  - American elm ..... *Ulmus americana*
  - Rock elm ..... *Ulmus thomasii*
  - Siberian elm ..... *Ulmus pumila*
  - Slippery elm ..... *Ulmus rubra*
- Hackberry ..... *Celtis occidentalis*
- Hickory
  - Bitternut hickory ..... *Carya cordiformis*
  - Mockernut hickory ..... *Carya tomentosa*
  - Pecan ..... *Carya illinoensis*
  - Pignut hickory ..... *Carya glabra*
  - Shagbark hickory ..... *Carya ovata*
  - Shellbark hickory ..... *Carya laciniosa*
- Honeylocust ..... *Gleditsia triacanthos*
- Maple (silver) ..... *Acer saccharinum*
- Red mulberry ..... *Morus rubra*
- Oak
  - Select red oaks
    - Northern red oak ..... *Quercus rubra*
  - Other red oaks
    - Black oak ..... *Quercus velutina*
    - Blackjack oak ..... *Quercus marilandica*
  - Select white oaks
    - Bur oak ..... *Quercus macrocarpa*
    - Chinkapin oak ..... *Quercus muehlenbergii*
  - Other white oaks
    - Swamp white oak ..... *Quercus bicolor*
- Osage-orange ..... *Maclura pomifera*
- Sycamore (American) ..... *Platanus occidentalis*
- Walnut (black) ..... *Juglans nigra*
- Willow (black) ..... *Salix nigra*

Table 1.--Timber products output from roundwood by species group and product, Nebraska, 1980

Species	All products	Saw logs		Fuelwood		Posts		Veneer logs		Other products
	MCF[1]	MBF[2]	MCF[1]	Cords[3]	MCF[1]	M pieces[4]	MCF[1]	MBF[2]	MCF[1]	MCF[1]
Softwoods										
Ponderosa pine	472	1,621	282	316	21	83	63	--	--	106
Eastern redcedar	56	152	31	--	--	33	25	--	--	--
Total	528	1,773	313	316	21	116	88	--	--	106
Hardwoods										
Green ash	1,702	56	8	24,192	1,694	--	--	--	--	--
Basswood	54	35	6	665	48	--	--	--	--	--
Boxelder	222	--	--	3,190	222	--	--	--	--	--
Cottonwood	3,034	15,420	2,377	7,934	557	3	1	433	99	--
Elm	593	24	2	8,434	591	--	--	--	--	--
Hackberry	948	23	3	13,495	944	3	1	--	--	--
Hickory	354	--	--	5,061	354	--	--	--	--	--
Soft maple	46	59	9	506	37	--	--	--	--	--
Red oak	527	56	9	7,280	510	13	8	--	--	--
White Oak	4,813	430	73	67,324	4,713	13	7	--	--	20
Sycamore	121	15	3	1,687	118	--	--	--	--	--
Black walnut	195	1,097	164	255	18	--	--	98	13	--
Willow	881	--	--	12,560	881	--	--	--	--	--
Osage-orange	316	--	--	3,142	220	166	96	--	--	--
Other hardwoods	914	3	[5]	12,959	906	17	8	--	--	--
Total	14,720	17,218	2,654	168,684	11,813	215	121	531	112	20
All species	15,248	18,991	2,967	169,000	11,834	331	209	531	112	126

[1] Thousand cubic feet.

[2] Thousand board feet, International 1/4-inch rule.

[3] Standard cords.

[4] Thousand pieces.

[5] Less than 500 cubic feet.

Table 2.--Timber products output from roundwood by species group, Nebraska, 1953 and 1980

(In thousand cubic feet)

Species group	1953	1980	Change
Softwoods			
Ponderosa pine	53	472	419
Eastern redcedar	2	56	54
Total	55	528	473
Hardwoods			
Green ash	275	1,702	1,427
Boxelder	328	222	-106
Cottonwood	1,109	3,034	1,925
Elm	748	593	-155
Hackberry	4	948	944
Soft maple	379	46	-333
Oak	1,497	5,340	3,843
Osage-orange	343	316	-27
Black walnut	358	195	-163
Other hardwoods	736	2,324	1,588
Total	5,777	14,720	8,943
All species	5,832	15,248	9,416

Table 3.--Number of active primary wood-using mills by Unit, Nebraska, 1980

Kind of mill	All Units	Eastern Unit	Western Unit
Sawmills			
Small[1/]	35	21	14
Medium[2/]	7	6	1
Cooperage mills	1	1	--
Charcoal plants	1	1	--
Miscellaneous plants[3/]	2	1	1
Total	46	30	16

[1/] Annual lumber output less than 1 million board feet.

[2/] Annual lumber output from 1 to 5 million board feet.

[3/] Fence post concentration yards and treating plants.

Table 4.--Timber products output from roundwood by species group and Unit, Nebraska, 1980

(In thousand cubic feet)

Species group	All Units	Eastern Unit	Western Unit
Softwoods			
Ponderosa pine	472	--	472
Eastern redcedar	56	34	22
Total	528	34	494
Hardwoods			
Green ash	1,702	1,232	470
Basswood	54	50	4
Boxelder	222	181	41
Cottonwood	3,034	2,709	325
Elm	593	552	41
Hackberry	948	891	57
Hickory	354	354	--
Soft maple	46	46	--
Red oak	527	527	--
White oak	4,813	3,551	1,262
Sycamore	121	121	--
Black walnut	195	190	5
Willow	881	672	209
Osage-orange	316	284	32
Other hardwoods	914	661	253
Total	14,720	12,021	2,699
All species	15,248	12,055	3,193

Table 5.--Saw log production by species group, Nebraska, 1953 and 1980

(In thousand board feet)[1/]

Species group	1953[2/]	1980	Change
Softwoods			
Ponderosa pine	372	1,621	1,249
Eastern redcedar	10	152	142
Total	382	1,773	1,391
Hardwoods			
Green ash	41	56	15
Basswood	6	35	29
Cottonwood	6,464	15,420	8,956
Elm	162	24	-138
Hackberry	28	23	-5
Soft maple	288	59	-229
Oak	358	486	128
Sycamore	4	15	11
Black walnut	462	1,097	635
Other hardwoods	2	3	1
Total	7,815	17,218	9,403
All species	8,197	18,991	10,794

[1/] International 1/4-inch rule.

[2/] Estimated based on lumber production.

Table 6.--Saw log production by Unit, species group and State of destination, Nebraska, 1980

(In thousand board feet)[1/]

Species group	All States	State		
		Nebraska	Kansas	Missouri
ALL UNITS				
Softwoods				
Ponderosa pine	1,621	1,621	--	--
Eastern redcedar	152	152	--	--
Total	1,773	1,773	--	--
Hardwoods				
Green ash	56	56	--	--
Basswood	35	35	--	--
Cottonwood	15,420	15,340	80	--
Elm	24	24	--	--
Hackberry	23	20	3	--
Soft maple	59	59	--	--
Red oak	56	56	--	--
White oak	430	430	--	--
Sycamore	15	15	--	--
Black walnut	1,097	264	585	248
Other hardwoods	3	3	--	--
Total	17,218	16,302	668	248
All species	18,991	18,075	668	248
EASTERN UNIT				
Softwoods				
Ponderosa pine	--	--	--	--
Eastern redcedar	139	139	--	--
Total	139	139	--	--
Hardwoods				
Green ash	55	55	--	--
Basswood	35	35	--	--
Cottonwood	14,259	14,179	80	--
Elm	15	15	--	--
Hackberry	22	19	3	--
Soft maple	59	59	--	--
Red oak	56	56	--	--
White oak	420	420	--	--
Sycamore	15	15	--	--
Black walnut	1,065	232	585	248
Other hardwoods	2	2	--	--
Total	16,003	15,087	668	248
All species	16,142	15,226	668	248
WESTERN UNIT				
Softwoods				
Ponderosa pine	1,621	1,621	--	--
Eastern redcedar	13	13	--	--
Total	1,634	1,634	--	--
Hardwoods				
Green ash	1	1	--	--
Basswood	--	--	--	--
Cottonwood	1,161	1,161	--	--
Elm	9	9	--	--
Hackberry	1	1	--	--
Soft maple	--	--	--	--
Red oak	--	--	--	--
White oak	10	10	--	--
Sycamore	--	--	--	--
Black walnut	32	32	--	--
Other hardwoods	1	1	--	--
Total	1,215	1,215	--	--
All species	2,849	2,849	--	--

[1/] International 1/4-inch rule.

Table 7.--Saw log production by Unit, county, and species group, Nebraska, 1980

(In thousand board feet)[1/]

EASTERN UNIT

County	All species	Species group: Ponderosa pine	Red-cedar	Green ash	Bass-wood	Cotton-wood	Elm	Hack-berry	Soft maple	Red oak	White oak	Syca-more	Black walnut	Other hardwoods
Boone	223	--	--	--	--	223	--	--	--	--	--	--	--	--
Buffalo	80	--	14	8	--	41	1	--	--	--	--	1	14	1
Burt	127	--	--	10	--	62	--	--	7	--	--	--	48	--
Butler	459	--	--	--	--	413	--	--	--	--	46	--	--	--
Cass	280	--	--	--	--	174	--	--	--	--	--	--	106	--
Cedar	525	--	--	--	--	525	--	--	--	--	--	--	--	--
Colfax	206	--	--	--	--	206	--	--	--	--	--	--	--	--
Cuming	1,075	--	--	1	--	1,066	--	--	1	--	--	--	7	--
Dakota	104	--	--	--	--	104	--	--	--	--	--	--	--	--
Dixon	125	--	--	7	--	104	--	--	7	--	--	--	7	--
Dodge	189	--	--	--	--	189	--	--	--	--	--	--	--	--
Douglas	32	--	--	--	--	32	--	--	--	--	--	--	--	--
Franklin	697	--	--	--	--	697	--	--	--	--	--	--	--	--
Furnas	8	--	--	--	--	8	--	--	--	--	--	--	--	--
Gage	135	--	--	--	--	--	--	--	--	21	41	--	73	--
Greeley	207	--	--	--	--	207	--	--	--	--	--	--	--	--
Hall	97	--	--	--	--	97	--	--	--	--	--	--	--	--
Hamilton	97	--	--	--	--	97	--	--	--	--	--	--	--	--
Harlan	414	--	--	--	--	414	--	--	--	--	--	--	--	--
Hitchcock	25	--	--	--	--	22	--	3	--	--	--	--	--	--
Howard	117	--	2	--	--	105	--	--	--	--	7	--	3	--
Jefferson	1	--	--	--	--	--	--	--	--	--	1	--	--	--
Johnson	114	--	--	1	--	3	--	1	4	--	7	--	98	--
Lancaster	286	--	--	--	--	268	--	--	--	--	18	--	--	--
Madison	1,188	--	--	--	--	1,188	--	--	--	--	--	--	--	--
Merrick	666	--	110	--	--	556	--	--	--	--	--	--	--	--
Nance	599	--	--	--	--	599	--	--	--	--	--	--	--	--
Nemaha	814	--	--	--	--	683	--	--	--	--	--	4	127	--
Otoe	633	--	--	--	--	475	--	--	--	--	--	4	154	--
Pawnee	575	--	1	7	--	224	--	11	23	21	115	--	173	--
Pierce	1,001	--	--	--	--	1,001	--	--	--	--	--	--	--	--
Platte	335	--	1	--	--	331	--	--	--	--	--	--	3	--
Polk	650	--	--	--	--	650	--	--	--	--	--	--	--	--
Red Willow	36	--	--	--	--	36	--	--	--	--	--	--	--	--
Richardson	835	--	--	4	--	574	--	6	11	--	54	6	180	--
Saline	288	--	--	--	--	233	--	--	--	--	55	--	--	--
Sarpy	63	--	--	--	--	15	--	--	--	--	--	--	48	--
Saunders	336	--	--	--	--	299	--	--	--	--	37	--	--	--
Seward	409	--	--	--	--	381	--	--	--	--	28	--	--	--
Sherman	111	--	--	--	--	111	--	--	--	--	--	--	--	--
Stanton	174	--	--	1	--	165	--	--	1	--	--	--	7	--
Thayer	11	--	--	--	--	10	--	--	--	--	1	--	--	--
Thurston	229	--	--	--	35	166	14	--	--	14	--	--	--	--
Valley	138	--	11	15	--	100	--	1	1	--	--	--	9	1
Washington	59	--	--	1	--	47	--	--	4	--	--	--	7	--
Wayne	380	--	--	--	--	380	--	--	--	--	--	--	--	--
Webster	628	--	--	--	--	628	--	--	--	--	--	--	--	--
York	361	--	--	--	--	350	--	--	--	--	10	--	1	--
Total	16,142	--	139	55	35	14,259	15	22	59	56	420	15	1,065	2

(Table 7 continued on next page)

(Table 7 continued)

WESTERN UNIT

County	All species	Species group: Ponderosa pine	Red-cedar	Green ash	Bass-wood	Cotton-wood	Elm	Hack-berry	Soft maple	Red oak	White oak	Syca-more	Black walnut	Other hardwoods
Antelope	60	3	1	--	--	28	--	--	--	--	--	--	28	--
Arthur	14	--	3	--	--	6	3	1	--	--	--	--	1	--
Brown	34	27	3	1	--	1	--	--	--	--	1	--	1	--
Dawes	171	171	--	--	--	--	--	--	--	--	--	--	--	--
Garfield	277	--	--	--	--	276	--	--	--	--	--	--	--	1
Holt	363	--	4	--	--	349	3	--	--	--	6	--	1	--
Keya Paha	18	13	2	--	--	2	--	--	--	--	--	--	1	--
Knox	404	--	--	--	--	398	3	--	--	--	3	--	--	--
Sheridan	110	110	--	--	--	--	--	--	--	--	--	--	--	--
Sioux	1,296	1,296	--	--	--	--	--	--	--	--	--	--	--	--
Thomas	1	1	--	--	--	--	--	--	--	--	--	--	--	--
Wheeler	101	--	--	--	--	101	--	--	--	--	--	--	--	--
Total	2,849	1,621	13	1	--	1,161	9	1	--	--	10	--	32	1
State total	18,991	1,621	152	56	35	15,420	24	23	59	56	430	15	1,097	3

[1/] International 1/4-inch rule.

Table 8.--Saw log receipts by Unit, species group, and State of origin, Nebraska, 1980

(In thousand board feet)[1/]

Species group	All States	State				
		Nebraska	South Dakota	Iowa	Kansas	Missouri
ALL UNITS						
Softwoods						
Ponderosa pine	1,621	1,621	--	--	--	--
Eastern redcedar	152	152	--	--	--	--
Total	1,773	1,773	--	--	--	--
Hardwoods						
Green ash	56	56	--	--	--	--
Basswood	35	35	--	--	--	--
Cottonwood	18,016	15,340	2,209	380	4	83
Elm	24	24	--	--	--	--
Hackberry	20	20	--	--	--	--
Soft maple	59	59	--	--	--	--
Red oak	56	56	--	--	--	--
White oak	555	430	--	--	125	--
Sycamore	15	15	--	--	--	--
Black walnut	285	264	--	3	18	--
Other hardwoods	3	3	--	--	--	--
Total	19,124	16,302	2,209	383	147	83
All species	20,897	18,075	2,209	383	147	83
EASTERN UNIT						
Softwoods						
Ponderosa pine	1	1	--	--	--	--
Eastern redcedar	139	139	--	--	--	--
Total	140	140	--	--	--	--
Hardwoods						
Green ash	55	55	--	--	--	--
Basswood	35	35	--	--	--	--
Cottonwood	17,608	14,932	2,209	380	4	83
Elm	15	15	--	--	--	--
Hackberry	19	19	--	--	--	--
Soft maple	59	59	--	--	--	--
Red oak	56	56	--	--	--	--
White oak	545	420	--	--	125	--
Sycamore	15	15	--	--	--	--
Black walnut	253	232	--	3	18	--
Other hardwoods	3	3	--	--	--	--
Total	18,663	15,841	2,209	383	147	83
All species	18,803	15,981	2,209	383	147	83
WESTERN UNIT						
Softwoods						
Ponderosa pine	1,620	1,620	--	--	--	--
Eastern redcedar	13	13	--	--	--	--
Total	1,633	1,633	--	--	--	--
Hardwoods						
Green ash	1	1	--	--	--	--
Cottonwood	408	408	--	--	--	--
Elm	9	9	--	--	--	--
Hackberry	1	1	--	--	--	--
White oak	10	10	--	--	--	--
Black walnut	32	32	--	--	--	--
Total	461	461	--	--	--	--
All species	2,094	2,094	--	--	--	--

[1/] International 1/4-inch rule.

Table 9.--Residue produced at primary wood-using mills by type of material, type of use, and Unit, Nebraska, 1980

(In thousand tons green weight)

Unit and type of use	Wood residue						Bark	
	Total		Coarse[1/]		Fine[2/]			
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Eastern Unit								
Domestic fuel[3/]	0.04	10.95	0.04	10.90	--	0.05	--	5.47
Miscellaneous[3/]	.25	16.75	.15	4.48	.10	12.27	.04	.62
Not used	--	13.48	--	10.23	--	3.25	--	4.96
Total	.29	41.18	.19	25.61	.10	15.57	.04	11.05
Western Unit								
Domestic fuel[3/]	1.53	.60	1.53	.60	--	--	.64	.27
Miscellaneous[3/]	1.55	.19	.49	--	1.06	.19	.28	--
Not used	.38	.16	.18	.01	.20	.15	.35	--
Total	3.46	.95	2.20	.61	1.26	.34	1.27	.27
All Units								
Domestic fuel[3/]	1.57	11.55	1.57	11.50	--	.05	.64	5.74
Miscellaneous[3/]	1.80	16.94	.64	4.48	1.16	12.46	.32	.62
Not used	.38	13.64	.18	10.24	.20	3.40	.35	4.96
Total	3.75	42.13	2.39	26.22	1.36	15.91	1.31	11.32

[1/] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2/] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3/] Livestock bedding, poultry litter, mulch, small dimension, specialty items, etc.

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Primary forest products industry and timber use, Nebraska, 1980. Resour. Bull. NC-80. St. Paul, MN: U.S. Department of Agriculture, Forest Services, North Central Forest Experiment Station; 1984. 11 p.

Highlights recent Nebraska forest industry trends, production and receipts of saw logs in 1980, and production of other timber products in 1980. Reports on wood and bark residue generated at primary mills and the disposition of this residue.

KEY WORDS: Saw logs, sawmills, fuelwood, posts, mill residue.